THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LIII. No. 1360.] LONDON, JUNE 4, 1889. [41ST YEAR. Price 6d.

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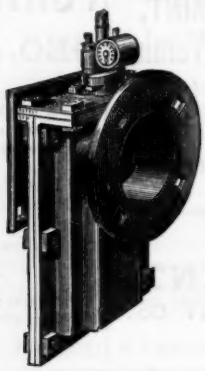

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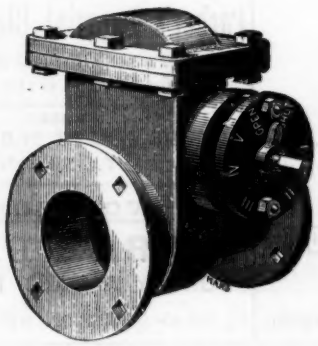

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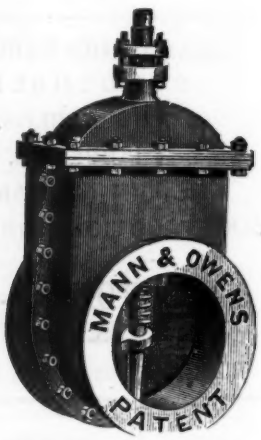

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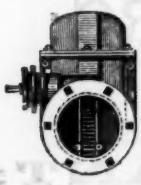

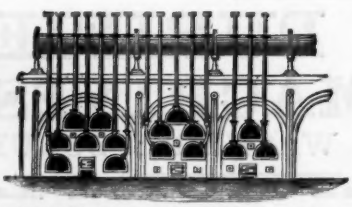

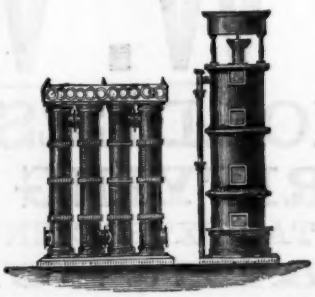

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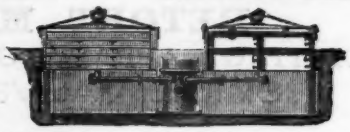

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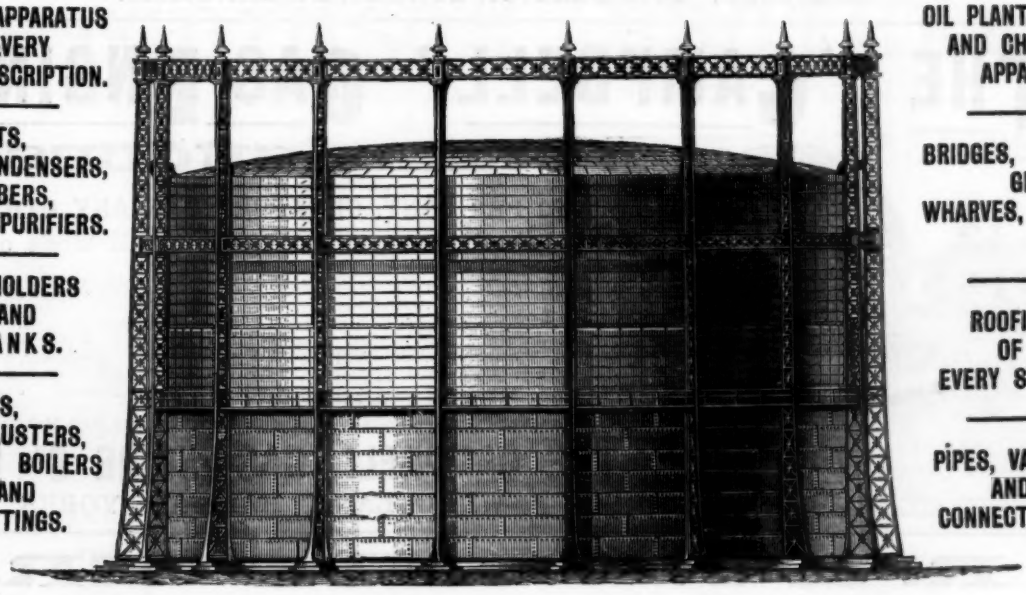

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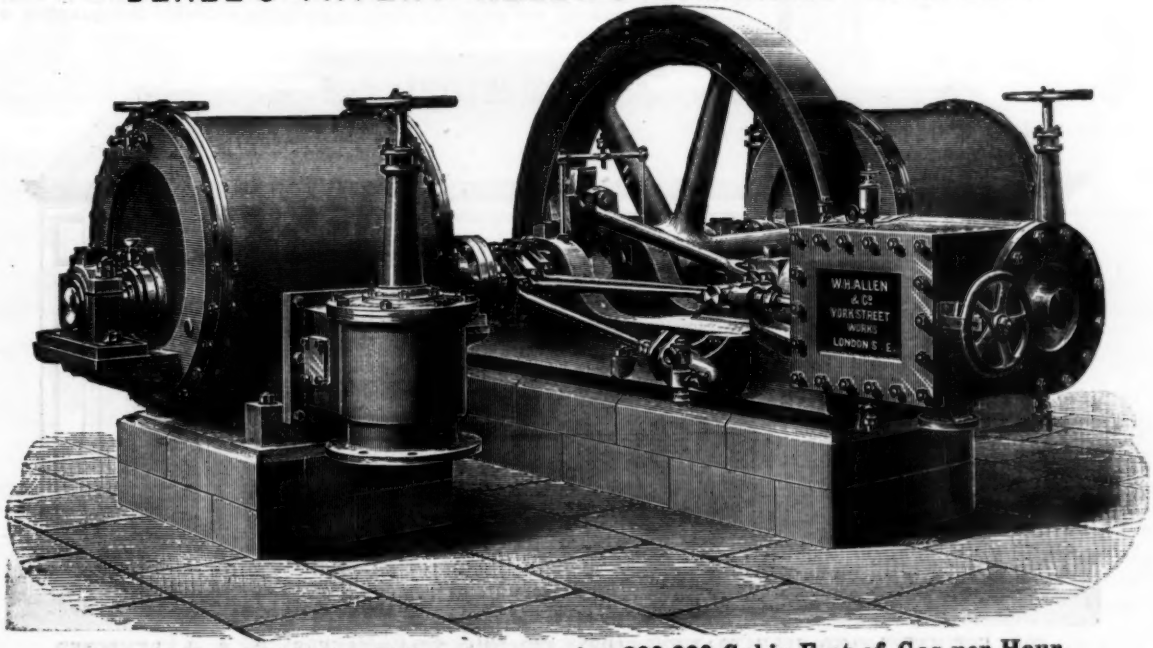

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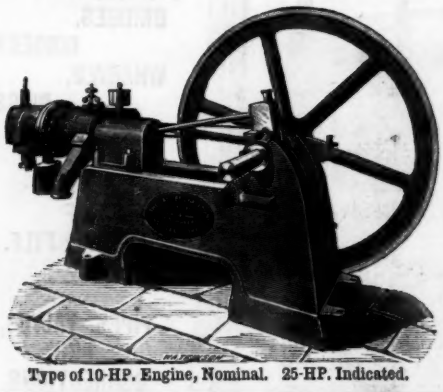

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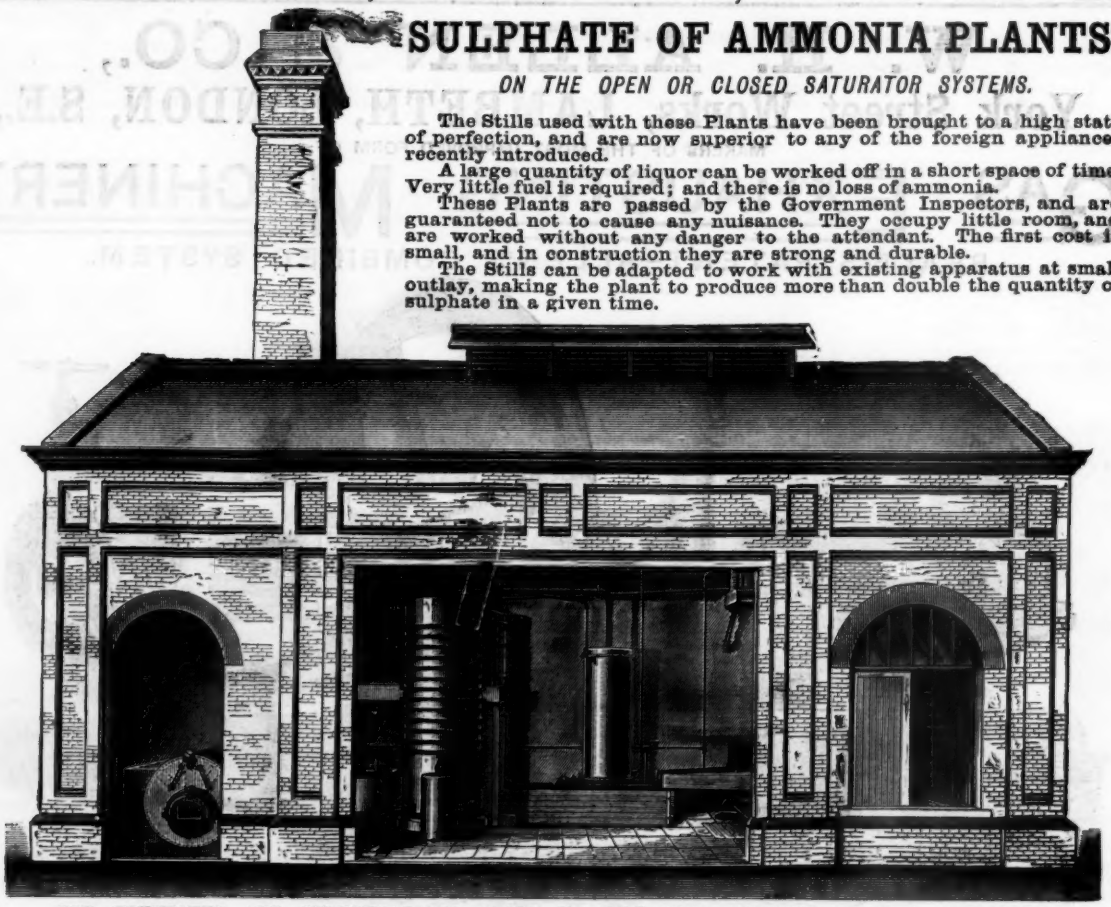

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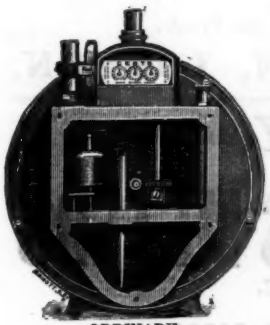

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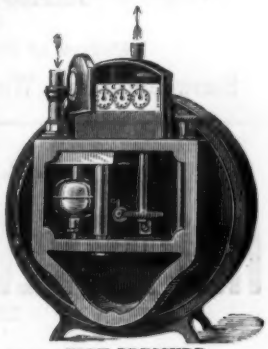

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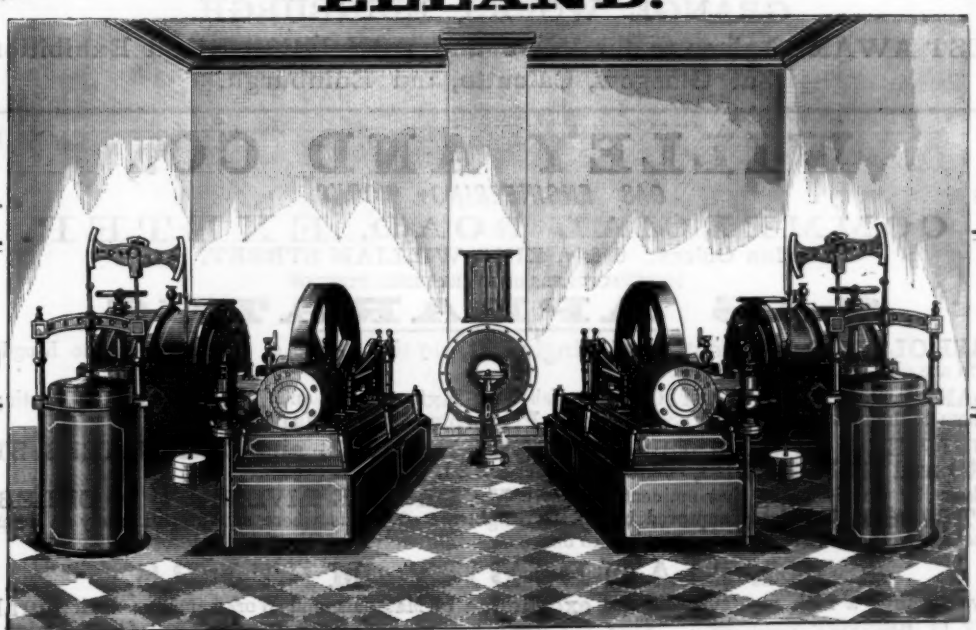

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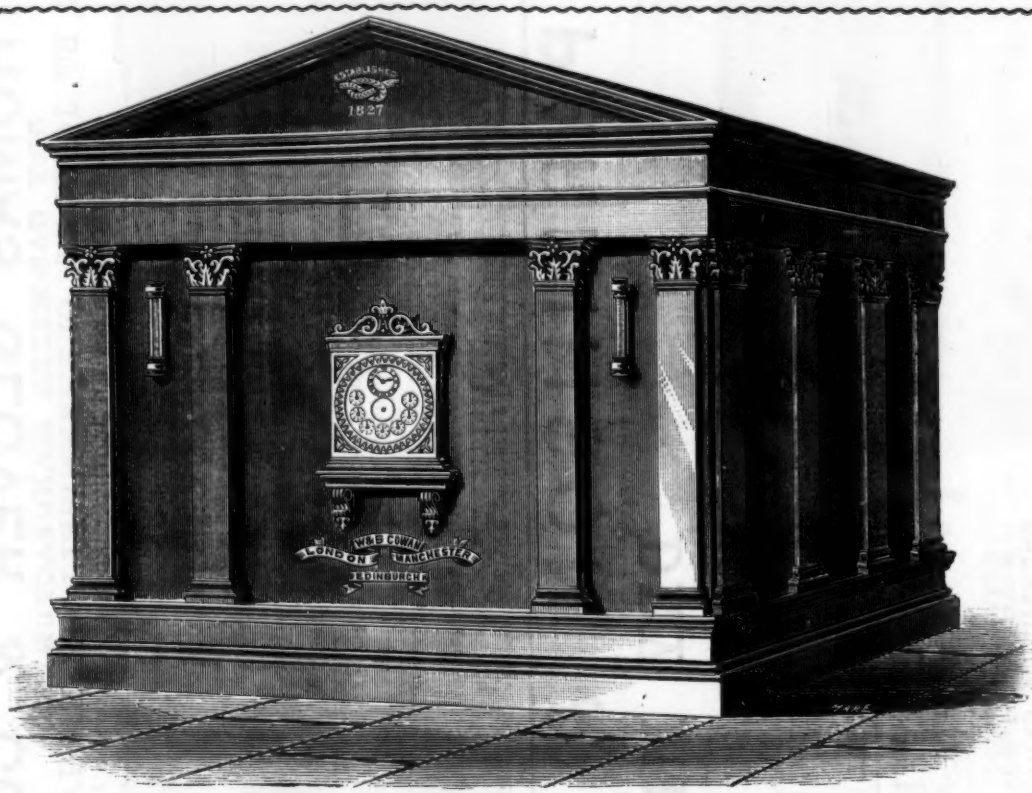

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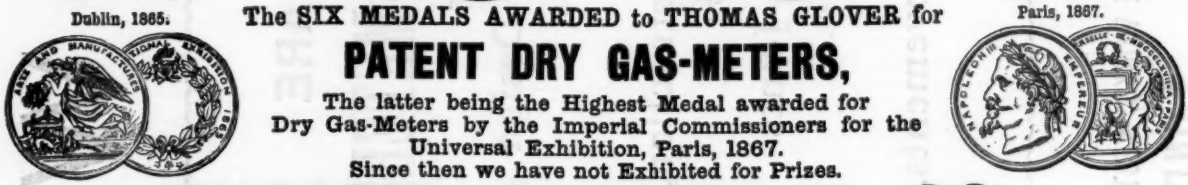

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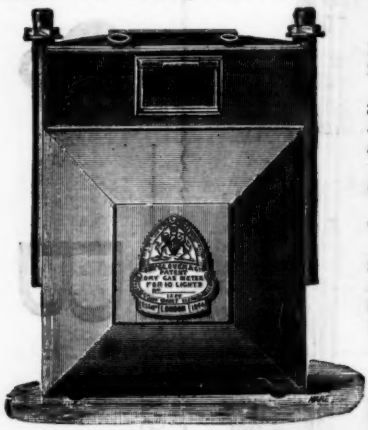

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10th—Will not cost more than one-half for repair that Wet or Water Meters do.
Are upheld for five years without charge.

Meters fitted with Grey's Index or Harding's Counter.

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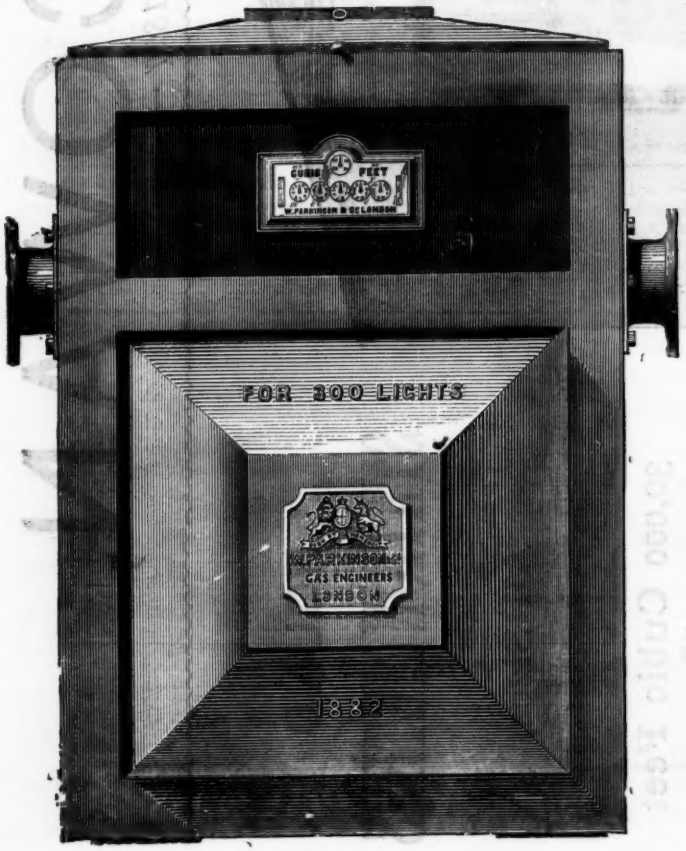

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With PATENT THREE-PARTITION DRUMS.

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CONTENTS.

EDITORIAL NOTES—*Gas, Lighting, &c.*:— PAGE
The Meeting of The Gas Institute . . . 1033
The Gas Supply of Manchester . . . 1034
The Birmingham Gas-Fitters and the Corporation . . . 1034
A Workman's Views of the Eight-Hour System . . . 1034
ESSAYS, COMMENTARIES, AND REVIEWS:—
Gas and Water Companies in the Stock Market . . . 1035
Electric Lighting Memoranda . . . 1035
The Board of Trade Returns relating to Authorised Gas Undertakings . . . 1036
Pyrology . . . 1038
NOTES:—
Cyanogen and its Compounds in the Products of the Distillation of Coal. 1040
A Cheap Thermostat . . . 1040
The Photometry of Electric Arc Lamps . . . 1040
The Corrosion of Iron in Structures and in Store . . . 1040
TECHNICAL RECORD:—
The Gas Institute—The Annual Report; The Programme of the Annual Meeting . . . 1041
REGISTER OF PATENTS:—
Apparatus for Producing Light—Methven, J. . . . 1041
Meters for Water and other Liquids—Thomson, J. . . . 1042
Lanterns for Gas Jets—Pilkington, W. L. . . . 1042
Automatically Registering Flows of Water or other Fluids and Application of the same to Rotary or other Meters—Sporton, H. H., and White, E. . . 1042
Gas Cooking-Stoves—Werdenberg, E. . . . 1042
Purifier Trays—Turnbull, G. H. . . . 1042
Patent Notices. . . . 1042
CORRESPONDENCE:—
The Representation of District Associations on the Council of The Gas Institute . . . 1043
Photometry . . . 1043
Gas Stokers and the Eight-Hours Movement . . . 1043
Water Gas . . . 1043
Water by Measure . . . 1043
Low-Pressure Water-Meters . . . 1043
PARLIAMENTARY INTELLIGENCE:—
House of Lords—Progress of Bills; Bills Royal Assented . . . 1044
House of Commons—Metropolis Water Bill Withdrawn; Coal Duties (London) Abolition Bill; Statistics of Metropolitan Water Companies; Progress of Bills . . . 1044
House of Lords Committee—Belfast Water Bill . . . 1044
LEGAL INTELLIGENCE:—
High Court of Justice—Queen's Bench Division—West *v.* The Gaslight and Coke Company . . . 1045
MISCELLANEOUS NEWS:—
Electric Lighting in the Metropolis—Board of Trade Inquiry . . . 1046
Meeting of the Monte Video Gas Company, . . . 1048
Meeting of the Buenos Ayres (New) Gas Company. . . . 1049
Meeting of the Belgrano (Buenos Ayres) Gas Company, Limited . . . 1050
Meeting of the British Water Gas Syndicate, Limited . . . 1050
Trustees in Bankruptcy and their Liabilities—Dispute over an Unpaid Gas Account . . . 1050
Manchester Corporation Gas Supply—Gas Committee's Report for the Year ending March 31, 1889 . . . 1051
The London County Council and the Coal Dues . . . 1051
The Projected Electric Lighting Scheme for Leeds . . . 1051
The Birmingham Gas Committee and Corporation Trading . . . 1052
West Bromwich Corporation Gas Supply—The Progress of the Gas Undertaking . . . 1053
Tipton Local Board Gas Supply . . . 1054
Oldham Corporation Gas Supply—The Annual Report. . . . 1054
Notes from Scotland . . . 1055
Current Sales of Gas Products . . . 1056
Gas and Water Companies' Stock and Share List . . . 1057
The Strain on Bent Pipes, 1089—Lighting Railway Carriages by Electricity, 1089—The Electric Lighting Scheme for Brussels, 1039—The Bacteriological Examination of Water, 1039—Mr. W. Foulis on Water Gas, 1039—Successful Artesian Borings 1040—A New Joint-Making Material, 1040—Gas Exhibition and Lectures in Bristol, 1042—The Differential Gas-Rate at Salford, 1042—Divining for Water at Hastings, 1045—Reductions in Price, 1045—The End of a Lighting Experiment at Askam, 1045—The Assessment of the Croydon Corporation Gas-Works, 1045—Sales of Shares, 1045—Gas Exhibition at Sleaford, 1045—The Linacre (Liverpool) Gas-Works Railway Branch, 1050—The Free Fixing of Gas Stoves, 1050—Staffordshire Potteries Water-Works Company, 1051—Northern Coal Trade, 1051—Grand Junction Water-Works Company, 1054—Liversedge Water Supply, 1054—The Electric Lighting Scheme for Birmingham, 1054—Free Cookery Lessons at Woolwich, 1056—Portsmouth and South Hants Electricity Supply Company, Limited, 1056—Blackburn Corporation Gas Supply, 1056—Extension of the Altrincham Gas-Works, 1056—Cantareira Water Company, 1056—Suggested Increase of the Price of Gas at Leeds, 1056—Otford Water Supply, 1056—The Water Question at Stainland, 1056—The Combination among Gas Workmen, 1056—Halstead Water Supply, 1056—North Shields Water Company, 1056—Leigh Local Board Gas Supply, 1056—East Surrey Water Company, 1056—Wigan Corporation Water Supply, 1057—The Thirlmere Water Scheme, 1057—The Purchase of the Mansfield Water-Works by the Improvement Commissioners, 1057—New Water-Works at Hinckley, 1057—An Old Well at Barton, 1057—Wakefield Corporation Water Supply, 1057.

TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

THE JOURNAL OF GAS LIGHTING,
WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, JUNE 4, 1889.

THE MEETING OF THE GAS INSTITUTE.

THE programme for the forthcoming annual general meeting of The Gas Institute has been issued, and unless we are greatly mistaken, will be scanned by members with even more than the usual amount of curiosity. We have always devoted an article in this column to The Gas Institute meetings; and this time last year we had occasion to promise members a particularly brilliant week, because of the arrangements made by the then Council for the reception of the members of the French Society. This year there is a great and deplorable change. Some members have hardly expected that there would be any meeting of the usual kind; but there certainly will be a meeting, and this is as much as can be said. Three days are to be devoted to this ostensible purpose; but although it is quite likely that there will be none too much time for the extraordinary business to be taken in hand, the technical part of the programme only comprises four papers, and there is not to be any dinner, evening gathering, or excursion. Of the papers, two are to be contributed by Mr. George Anderson, and will be on retort-settings and purifiers respectively; a third is to be by Mr. Norton H. Humphrys, of Salisbury, and will relate the history of a heap of oxide; and the fourth is to be a repetition of Mr. W. A. Valon's experiences with oxygen in gas purification. How many members will think it worth while to give three days in London for the disposal of such a programme remains to be seen. It must be understood that we do not blame the Council specifically for this poverty of fare. They could not help themselves in the matter; for a maimed meeting is only the natural product of a paralyzed society. Where they have been in error throughout is in trying to blind themselves and their followers to the gravity of the change that has come over the Institute since the last meeting. They have proclaimed, with all the force at their command, that the actual defection from the Institute has been insignificant, and that they have received much support from members in all parts of the country, in their endeavour to carry on the Institute as though nothing had happened. This being the line taken by the Council, it might have been expected that they would be careful to put forward a programme for the coming meeting differing as little as possible from, even if it showed no improvement upon, the order of proceedings of former years. Any little shortcoming in the tale of papers or list of visits would have been pardoned on account of their circumstances; but to offer absolutely nothing in the way of outdoor engagements, and to submit such meagre technical fare, is tantamount to a confession that the life has gone out of the Institute. We do not wish for a moment to hurt the feelings of the intending contributors of papers by comparing their offerings with programmes of other times; but what do they amount to? Mr. Valon's is the only paper that smacks of originality; and even this has been discounted by the proceedings at the recent meeting of the Southern District Association. Anyhow, three of the four papers deal with questions of gas purification; and the other is on retort-settings. It cannot be called, even in charity, a brilliant showing for a national society. It is a matter for greater wonder that nothing at all is said of any trip, or other social gathering at which men who are scattered for the rest of the year over the three kingdoms might enjoy the renewal of old friendships, which is alone an inducement to them to come to these meetings. We do not allude to the proposed excursion to Paris, because this is outside the ordinary proceedings. It certainly looks as if the Council expected a small, and not particularly united meeting.

With regard to the constitutional business, which is apparently supposed by the Council to be sufficient in itself for this year's meeting to transact, there is nothing fresh to be said. The chair will be taken at the Institution of Civil Engineers on Tuesday, the 18th inst., at eleven o'clock, and thereupon the contentious matter on the *agenda* will be forthwith attacked. It is impossible to foretell what may be the character of the proceedings. They may be stormy and protracted; or, on the other hand, are just as likely to collapse. The Council will come up for judgment; and nobody can say whether they will face a "beggarly array of empty "benches" or an eager and critical crowd. The members of The Gas Institute are particularly difficult to prophesy for in ordinary times; and this is specially the case at the present juncture. It is not our intention to offer any advice, either to the Council or the members, respecting the course to be followed by the meeting. We have recorded and discussed Gas Institute affairs almost week by week from the time when the Council appointed last year broke up, and a remnant essayed to rule the destiny of the association on the simple principle of ignoring patent facts. Apart from defining this fundamental error, as we regard it, we have nothing more to say respecting the conduct of the minority of the Council in their capacity as representatives of the members. It will now be for the members themselves to say what they think of it all. This verdict will, of course, be independent of what the outside world may hold respecting the position of the Institute as a representative organization. A Council driven to desperation might recommend, and a few members present at a meeting nominally qualified to deal with the suggestion might agree to, any plausible course; but resolutions without anything behind them are only wind.

The Council have issued their report, which is reproduced

in another column. It will scarcely be accepted on all sides as a faithful statement of all that has taken place since the last annual meeting, and that has left the record that what was once a Council of twenty-four is now a Council of six. It would be impossible to go through this curious production sentence by sentence for the purpose of correcting it where it is misleading, and of setting forth the other side where it is partial. Of course, as a partizan document it may be pardoned for being a little one-sided, and for being framed to make out the present members of the Council to have been invariably right and their opponents always wrong. For the official proclamation of a professional scientific or technical society claiming to be representative, however, it is deplorably slipshod in form; and a perusal of the statement leaves the reader utterly bewildered as to the style of address in which it is composed. It further appears from the report that the Council are in a little difficulty with regard to Trustees. They want three fresh names for this responsible office in connection with the Institute, and two for the Benevolent Fund; but besides the late Mr. R. P. Spice, whose death they rightly deplore, the Council do not seem to have been able to find any gentleman whom they could nominate for the position. Finally, the report admits a loss of 103 members all told, and concludes with a reiteration of the intention of the Council to bestow the Birmingham Medal, as to which something more must be said in the meeting.

The questions left to members are therefore to be summarized in five queries, as follows: (1) Do they approve of the past policy of the remainder of the Council? (2) Are they satisfied with the proposals submitted for the reconstitution of the Institute, including the projected relegation of the whole class of extra-ordinary members to the rank of associates or associate members? (3) Do they think the programme of the forthcoming meeting satisfactory? (4) Are they content with the proposal to award the Birmingham Medal at the discretion of three or four members of Council? (5) Do they consider that, by the methods proposed by the Council, or any others not yet formulated, the Institute will be rehabilitated as a worthy national and representative organization for the gas industry? These are the matters to be settled by the members at their meeting a fortnight hence; and according to the manner of their dealing with these points will public opinion be formed.

THE GAS SUPPLY OF MANCHESTER.

The report and accounts of the Manchester Corporation Gas Committee for the year ending March 31 last have been published, and will be considered by the Town Council to-morrow. The report, which is given elsewhere, states that the increase of gas consumption in the district was 2·05 per cent. for the year; there being a greater increase for the summer months, when gas cooking-stoves are most in use, than during the winter. The percentage of unaccounted-for gas has risen from 4·85 to 5·64. The public lighting has been improved. The gas-rental reached a total of £384,314, which shows an increase of £3074 for the year; while residual products were £7195 better. A sum of £33,264 has been written off for depreciation, and with amounts of £28,403 for interest, £7874 for expenses of street lighting, £26,454 for the sinking fund, and £25,000 paid to the city fund account, represents the burden of "profit." After this a balance of £17,748 has been transferred towards the liquidation of the adverse balance on the profit and loss account for previous years; thus reducing this amount to £10,183. The Committee remark that, "in view of 'the unsettled state of the various illuminating agents, and 'the possibility of gas being to some extent superseded," they have decided, "after much inquiry and discussion," to continue for the present both the depreciation and sinking funds —that is to say, to persevere in burdening the price of their gas by so much more than a Company similarly situated would find necessary. Still, the undertaking has done so well that the Committee have arrived at the tremendous conviction that they may safely reduce the price of gas by 2d. per 1000 cubic feet, for which boon the consumers are doubtless expected to be properly grateful. This will bring the price of gas in the city down to 2s. 6d. per 1000 cubic feet. Having done so much for gas, the Committee mean to turn their attention to electric lighting, with a view, probably, of making friends with the enemy. It would be more to the purpose if they would take another 6d. off the price of gas, and push the trade for the purpose of utilizing some of the superfluous plant which they are now depreciating. To do this, however, would entail the surrender by the city of the subsidies which the rate fund now receives from the gas revenue, and would not be endured at the centre of the Free Trade system. Fiscal heresy is hard to kill; and it is an anomaly that we are almost weary of pointing out, that the democratic municipalities of the country are almost the last strongholds of the policy of taxing a necessary of life as a means of indirectly raising revenue. The system will perhaps remain in favour in Manchester until the Corporation build another hotel. One such vagary has done something to shake it; but a second would in all probability sound its death-knell.

THE BIRMINGHAM GAS-FITTERS AND THE CORPORATION.

Some months since the gas-fitters of Birmingham submitted to the Corporation a protest against the sale and fixing of gas-fittings by the Gas Committee; and the matter was referred to the Committee to inquire and report. The memorial of the gas-fitters stated that the Committee were ruining the gas-fitting trade in the town, without benefiting the ratepayers, and offered to submit evidence to this effect. Accordingly, an inquiry was held by the Committee; and it has resulted in the report which will be found in abstract in another column. The gas-fitters' grievance was divisible into two heads—first, that the Corporation had no right, as a matter of principle, to embark in this trade; and, secondly, that they had carried it on in a manner to inflict hardship and loss on private traders. As frequently happens when complaint is made of methods of administering public affairs in this country, the grievance which underlay the complaint became smaller the moment it was critically examined. Whatever may be the ethics of Corporation trading in gas-fittings, it is certain that the great majority of corporations owning gas undertakings practise it; and so do many Gas Companies. It is difficult to see wherein the competition of a Gas Committee of a Local Authority with private traders differs from that of a gas company; and the object, as we take it, is precisely the same—to enable gas consumers to obtain good fittings at reasonable cost. The Birmingham Gas Committee have no difficulty in meeting their accusers on this general question. They only do like others similarly situated, and are easily able to demonstrate the justice of the principle. Nor can Corporation trading in gas-fittings be condemned unless on the same grounds as Corporation gas supply—that it is contrary to sound principle that local governing bodies should become traders. This contention is defensible enough; but it is impossible to argue that a Corporation may be interested in gas but not in fittings. It can, on the other hand, be shown that to give gas suppliers the concurrent—not the exclusive—right to sell fittings is of the greatest advantage to consumers, as ensuring to the latter a means of learning what appliances are best for their requirements from an authority whose interest in this point is identical with their own, while at the same time private enterprise remains available as a check upon the official system. Experience abundantly demonstrates that a sharp tradesman, working in an enlightened way for his own advantage, has nothing to fear from Company or Corporation competition. As to the manner in which the Birmingham Gas Committee have conducted their fittings department, the report speaks for itself, and effectually disposes of the tradesmen's complaint of unfair dealing. It so happens that everything in Birmingham is made a question of party politics; and thus in the present case it was a foregone conclusion that whatever might be the tenor of the report, the local newspapers of one political colour would find fault with it, while the others would support the Committee. This is one of the disadvantages of Corporation trading which neither party is likely to point out; and accordingly we do it for them. Upon the question of fact there is no more to be said. It would unquestionably be for the public advantage everywhere if gas suppliers had not less, but more to do with consumers' fittings than the Birmingham Gas Committee. Gas-fitters and cheap builders have worked their will far too freely for the good of the public and the credit of gas lighting; and it is to be hoped that, through the interference of suppliers of gas everywhere, the reign of the "cheap and nasty" in gas-fittings will be terminated.

A WORKMAN'S VIEWS OF THE EIGHT-HOUR SYSTEM.

The letter from "A Workman" on the eight-hour system in gas retort-houses which we published in last week's Journal, gives us the opportunity for stating that we shall be very pleased to receive contributions towards the discussion of this subject from any side. No harm, but great good, will ensue

from the fullest debate upon the points at issue between the advocates of both views of the question, so long as all are content to be candid, and to give their opponents as much credit for good intentions as they claim for themselves. The only thing that should be objected to in the discussion of the subject is false statement. Our friend the "Workman" contends that we are wrong in remarking that a twelve-hours shift never harmed a strong, healthy man; and he asserts that it is as much as he can do to stand the arduous labour of the eight-hour shift. This is quite possible; but it does not dispose of our assertion, which can be supported if necessary, that there are at this moment in existence and at work many old stokers who have shouldered the scoop or handled the shovel, as the case may be, without a day's intermission through sickness, for periods of 25 years and upwards. We are quite free to claim that the health statistics of gas stokers working twelve-hour shifts prove them to be in the enjoyment of exceptional lasting powers, such as might be envied by many men employed in lighter work. Moreover, our correspondent ignores an essential part of the question, which is the actual amount of work done in a shift. We shall be borne out by our professional readers in the statement that, out of the ordinary twelve-hour shift, the stoker does not actually work at the mouthpieces for more than five or six hours altogether, The point is, how many draws the stoker is required to do in his shift, how long they take, and what intervals of rest remain. It is quite possible for an eight-hour shift to be very much more laborious than one of twelve hours. Then, again, we are by no means satisfied that the alteration from twelve-hour to eight-hour shifts in the case of men long accustomed to the former would be the unmixed good some of them appear to imagine. It is largely a question of habit. If men are used to work (say) from six in the morning to six in the evening, their whole domestic arrangements are made accordingly. If, on the other hand, the same men go off at two o'clock in the day till six the next morning, what will many of them do with the time? Some will doubtless use it for self-improvement, as does our correspondent, whom we congratulate upon the fact. He is likely to become a foreman, if he is not so at present. With many, however, we fear that the moral of the lines that "Satan finds some "mischief still for idle hands to do," is only too likely to be verified. It may not be many who would go wrong; but the temptation would be great at first, before the system had got into working order and the weak members were weeded out. To start a system of this kind in a works of comparatively small magnitude is a different thing from making the change in a large factory. Of course, if anybody argues that men who are likely to fall away in this manner are unworthy of the smallest solicitude, well and good. That is an argument, such as it is. On the other hand, it would be pitiable to reflect too late that men who had gone on well in their daily work for years had fallen into bad courses simply through an alteration in the system of their employment. In London, especially, where many men travel long distances to and from their work, it is easy for them to do so cheaply with workmen's tickets at stated hours of the morning and evening, but not at other times. Where works are isolated, and the men live round them, this objection is of less force. As we have already said, we have no prejudice in the matter, and are only anxious that the settlement, whatever it is, shall be satisfactory to both parties.

Col. Edis, F.S.A., and Mr. H. H. Nelson have recently joined the Board of the Wenham Company, Limited.

In the notice of the report of the Directors of the Hastings Electric Lighting Company which appeared in the last number of the Journal (p. 1010), it was stated that they proposed to pay a dividend of 5 per cent. We now learn, from a report of the proceedings at the Company's meeting which has been forwarded to us by an esteemed correspondent, that the dividend was only 3 per cent. The Chairman (Mr. H. M. Balser, J.P.), in moving the adoption of the report, confessed that this dividend was at present on paper merely, and not in cash; but he stated that as soon as arrangements could be made, it would be paid.

The author of the article on the "Water Gas Syndicate" which was reproduced in the Journal last week from the *Iron and Coal Trades Review*, writes us that he has lately seen an anonymous letter defending the Syndicate, in which the writer says the size of the mains for the distribution of water gas will be 1-10th that of gas-mains. "This," our correspondent remarks, "is a very big drop from 1-650th. The pressure now is to be only about 180 inches of water; so that before it would have been 15 feet × 65 feet = 975 feet." He adds: "I should not like to be by when a main charged with gas containing 44 per cent. of carbonic oxide burst under a pressure equal to the height of the Eiffel Tower."

Essays, Commentaries, and Reviews.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 1057.)

Although not so absolutely listless as its predecessor, last week was extremely quiet on the Stock Exchange. Apart from the settlement, business was at a low ebb; and there is no prospect of the return flood setting in yet awhile. The course of the markets was uneven and fluctuating; railways having the best of it. The Money Market has not undergone any change, and rates are steady. The Gas Market has not been particularly active, and would have been very quiet indeed, but for the dealings in the two chief issues, which had been depressed the previous week, but now made some recovery. Gaslight "A" improved from the opening, and from 256 advanced to 259 on Thursday; but a reaction set in again, and the closing mark was 1½ below the best of the week. The quotation, however, was an improvement of 2½ on that of the previous week. The 10 per cent. preferences and the 7 per cent. maximum continued to be offered. The 6 per cent. debentures also are 1½ lower. South Metropolitans have been extremely quiet. The "A" was done twice at steady figures; but the only mark in "B" was one transaction on Saturday at 242, with a drop of 3 off the quotation. Commercials have shown more activity; but the prices marked were only moderate. Suburbans and Provincials have been altogether without any feature. Among the Foreign division, Imperial Continental was heavy at the opening, and on Wednesday was done as low as 203. The next day, however, it jumped to 206, and touched a point higher on Friday; closing firm at an advance of 1 on the week. Buenos Ayres (whose meeting gave satisfaction all round) has been very quiet. Moderate business has been done in several other undertakings; but the only noteworthy features are advances of ¼ in Monte Video, and ¼ in Bombay and in Oriental. The Water Companies have been excessively quiet—stagnant for days together; but the tone is very good throughout, and several have improved in quotation.

The daily operations were: Gas stocks were quiet on Monday, except Gaslight "A," which had a good healthy tone, and improved 1. The "H" and "J," however, receded to a similar extent; and the 6 per cent. debenture, 1½. In Water, Lambeth changed hands at good prices, and rose 2. West Middlesex also gained 2; but no business was done in it. Tuesday was very quiet—nothing at all being done in Gas. Water was just the same, and all quotations were stationary. There was more activity in Gas on Wednesday, with firmness in Gaslight "A" and South Metropolitan "A." Gaslight "H," however, fell 1; and Imperial Continental showed weakness. Water was not dealt in; but Chelsea rose 2. Increased firmness was the characteristic of Gas on Thursday, though business was only moderate. Gaslight "A" rose 1½; Imperial Continental, 1; and Bombay, Buenos Ayres, and Oriental, ¼ each. Water was an absolute blank. Friday's business was nearly all in Gaslight "A" and Imperial Continental; but the former was scarcely so firm as on the preceding day. The "H," however, recovered 1. Nothing was touched in Water but West Middlesex; though both the Southwarks rose 2, and Chelsea 1. Saturday was unusually active; but prices generally were poor. South Metropolitan "B" fell 3; but Monte Video advanced ¼. A couple of transactions in East London, at middle figures, were all that was done in Water.

ELECTRIC LIGHTING MEMORANDA.

ELECTRIC LIGHTING IN FRANCE—PRESS OPINIONS OF MAJOR MARINDIN'S REPORT—THE ELECTRICAL WELDING PROCESS AT THE PARIS EXHIBITION—THE COST OF THE FORCIBLE REMOVAL OF ELECTRICAL POLES AND WIRES IN NEW YORK.

A remarkable specimen of the quality of the "news" served up by the London daily papers for the instruction of the public appears in a paragraph in the "Paris Day by Day" column of the *Daily Telegraph* for Thursday last. It relates to the electric light in France, and roundly states that "gas is gradually giving in to the new method of illumination in the Metropolis as well as in the large provincial towns, such as Marseilles, Lyons, and Bordeaux, where Edison and his rivals have long since superseded to a great extent the gas companies." How much truth there is in this statement as regards Paris, may be inferred from what we have so recently had to report concerning the phenomenal growth of the business of the Paris Gas Company. As to the supersession of gas in the other towns named, the very sweeping character of the statement carries its own refutation. Nothing of the kind has ever been claimed by electricians themselves; and the report is merely the scribbling of a press man desirous of filling up his packet of news with something, no matter what. In the succeeding sentence, moreover, the writer lets out the truth, for he says that "a good many hitches occur with the electric light every evening, and the other night one side of the Champ de Mars was suddenly plunged into obscurity, while the Manager of one of the Exhibition theatres had to suspend his performance and return the money owing to lack of light." This does not look as though electric lighting was making much advance in Paris. Of course, while the Exhibition is going on, the prominent part played by electric lamps in the illumination of the buildings and grounds will naturally attract an unusual amount of attention to this system of lighting; and tradesmen of an advertising turn will think that if they can set up an electric lamp or two upon their premises they will to that extent approximate the attractions of their establish-

ments to those of the great show. Electricians may therefore look hopefully to pick up a little extra business in Paris while the Exhibition is open; but their high charges will militate seriously against the permanence of their trade.

Major Marindin's report on the London electric lighting schemes submitted to him has been very well received by the press; there being a general agreement that he has managed to educe as much system as could be hoped for out of the confusion of projects with which he had to deal. The public are being told on all sides that if they get the offer of incandescent lighting at a price to start with of about 7d. per unit, which corresponds to about 7s. 6d. per 1000 cubic feet for gas, they will have a boon which they ought to appreciate. There is some promise that Major Marindin's advice will be taken, and the Companies' ideas respecting the minimum rental that should be guaranteed substantially modified. At any rate, prospective users of electric lighting will have to pay for services, for interior wiring, and for breakages of lamps. The cost of the service can scarcely be less than £3, and the wiring will run to at least 30s. per lamp for the most ordinary patterns of fittings. Then the lamps will cost 5s. each, and the number of breakages will largely depend upon the regularity of the supply. It would therefore be much fairer for the Continental rule to be adopted, by which the Company pay for all lamps rendered useless by breakage of the wire loop while the glass remains intact; the consumer only bearing the cost of renewing old and dirty lamps and paying for broken glass. On the whole, although the expense is admittedly high and the utility of the service limited, the Companies who propose to supply electric light in London are assured by the press that they may expect to do a fair trade when they are ready to begin business; but that they must not be too sanguine. It is recognized that "the circumstance that gas serves not only as a source of illumination, but also for cooking and heating purposes, as well as for motive power, adds to the difficulty of superseding it. Gas warms the bath, boils the kettle, will cook a joint of meat, or drive an engine of several horse power. A current which simply gives light and nothing else, unless it be an ugly shock to the human body, or perhaps some little heat at an extravagant cost, is thus placed at a disadvantage." There is good sense in this extract from *The Engineer;* and it is a pity that the same considerations have not operated on former occasions to check the exuberance of partizans of electricity.

The Thompson-Houston electric-welding machines are a great attraction at the Paris Exhibition, where several of these appliances of the latest form are shown in action. Welding is done in bars up to 2 inches diameter, and in pipes up to 2½ inch. From 60 to 80 horse power is concentrated in the electric arc which fuses and ultimately unites the metal. The ends to be joined are first filed slightly conical, so that contact and fusion shall begin at the centre of the substance of the metal, and progress to the outside as the ends are forced together. It is a peculiar result of this process that any slag or impurity thrown out by the melting comes to the outside of the bar. It seems probable that there is a future for this process. The proprietors belong to that remarkable category of eminent American inventors which includes also Edison, Westinghouse, and Maxim—all men of proved genius, whose work stands apart from the restricted labours of other mechanicians.

There has, very naturally, been a great deal of discussion in the New York newspapers concerning the recent forcible removal of the overhead electric poles and wires by the Mayor's order. It has been a troublesome and an expensive business. The cutting down and carting to the Corporation yard of the poles and wires has cost the City $11,000 up to the present time; and will run into a very great deal more before the work is completed all over the City. The old materials are sold by auction; but the return received in this way is insignificant. It costs a dollar to cut down a pole that afterwards sells for 20 cents. The wire, being cut into short lengths for convenience of removal, is almost worthless with the small exception of so much as is of copper. It is reckoned that it will be at least two years' work to clear the whole city of wires that have been years in growing more plentiful and objectionable; and the rule-of-three sum which indicates the probable cost of the process has alarmed the authorities. Consequently, the Mayor has drafted and submitted a Bill to the State Legislature, charging upon the companies owning the wires the loss sustained by the City in removing them. This will be resented by the electricians as a fresh outrage; but they have themselves to thank for the trouble, seeing that they ignored the Mayor's order to remove their wires until the municipal forbearance of trade interest was strained to the cracking point. It has been attempted to rouse up popular feeling against the Mayor on account of his action; but the public are on his side.

THE Dinsmore Gas Company have engaged Professor W. Foster to report on their process at the various works where it is now in operation.

THE death has just been announced, in Paris, of M. Gaston Planté, whose researches in connection with the problem of voltaic accumulation, and discovery of the lead accumulator, are well known to all electricians. M. Planté was at one time Chemist to the eminent firm of MM. Christofle et Cie.; and his work there led him to study the phenomena of polarization, of which his discovery was the outcome. The later work of Faure, Swan, Sellon, and other electricians, for the improvement of the accumulators, was entirely based on that of Planté, who was the inventor of the rheostatic discharger, and author of several electrical works.

THE BOARD OF TRADE RETURNS RELATING TO AUTHORIZED GAS UNDERTAKINGS.

THE figures contained in the two parliamentary papers comprising the returns made to the Board of Trade in relation to all authorized gas undertakings in the United Kingdom for the year 1887, to which attention has already been called in the JOURNAL, have reference to 552 such undertakings. But in 35 instances the information furnished was incomplete under one or more of the chief heads; in a few cases the particulars were redundant, as not being limited to gas, but including water undertakings; two authorized gas undertakings, both belonging to other than Local Authorities—viz., at Chapel-en-le-Frith and at Long Melford—failed to make any return to the order of the House of Commons; and in another similar instance (that of Risca and Pontymister) the figures printed in the return relate to the year 1884, default having been made in the three years that have since then elapsed. Strictly speaking, this should have been treated by the Board of Trade officials as a case of "No returns." There can be no analogy between the conditions and statistics of 1884 and those of 1887; wherefore the reproduction of the figures is not only absurd but vicious. As regards Chapel-en-le-Frith, it may be noted that for six consecutive years—in fact, since the first issue of these statistics in 1883—no return whatever has been made in relation to this undertaking. From the very first, Chapel-en-le-Frith has been contumacious. This verges on the farcical. If the Board of Trade have powers, why do they not put them in force? If not, Why continue knocking at a door that has been kept contemptuously closed against them for six long years?

Turning to the totals of the figures as given in the returns, we proceed to deal with them as they are, although, as we have shown in the previous article (*ante*, p. 850), they are far from being accurate and reliable. The aggregate total of the capital authorized for the 552 undertakings amounted to £74,289,595, whereof £23,269,702, or 31·32 per cent. is appropriated to Local Authorities, and £51,019,893, or 68·68 per cent., to other than Local Authorities. Of this sum, the proportion actually raised, either paid up or borrowed (by shares, loans, annuities, &c.) was 77·37 per cent., or £57,478,015; leaving 22·63 per cent., or powers to raise £16,811,580, not yet exercised. Of the total amount raised, 34·94 per cent., or £20,081,435, belong to the Local Authorities; and the remainder, 65·06 per cent., or £37,396,580, to the Companies, &c. Thus the Local Authorities held rather less than one-third of the capital amount authorized, but a little more than one-third of the working capital raised, which in their case was 86·30 per cent. of that authorized (nearly seven-eighths); whereas the proportion actually raised by the Companies was only 73·30 per cent., or less than six-eighths. The 20 millions odd raised by the Local Authorities were borrowed, as a matter of course, and professedly represent the full original amount, as the column heading states specifically "not deducting amount repaid;" but this is not so, as anyone may readily discover on inspection. The amount raised by other than Local Authorities comprises share capital (including premiums) and loan capital, in the respective proportions of 84·38 and 15·62 per cent.—viz., £31,556,788 and £5,839,792. Of the share capital (in round numbers, 41 millions), rather more than one-fourth—£11,006,190—was subject to auction clauses; and the actual amount so sold was £3,354,093, or 30·47 per cent., realizing £1,473,656 as premiums. Thus, every £100 nominal of share capital sold for £143·94, as compared with £143·43 in the preceding year. This additional non-dividend-paying capital represents a little over 4 per cent. on the total share and loan capital of the Companies. The increase in the amount of premiums thus realized, as compared with the preceding year (1886), is £79,983, or 5·74 per cent.; showing a decline from the corresponding figures of 1886, when the increase was £87,535, or 6·70 per cent. The yearly increase (shown by the figures) for 1887 over 1886, in the amount of capital sold under auction clauses was at the rate of 4·50 per cent.; and in the amount of authorized capital subject to auction clauses, 5·08 per cent.

In preceding years, our notice of the financial details for the gas undertakings generally, was necessarily limited to capital, inasmuch as it was only in the return relating to Local Authorities that any information was given in reference to the revenue accounts of the undertakings. In the returns for 1887, now under review, an important extension has been given to the returns relating to Companies, by three additional columns, containing the particulars of the total receipts (revenue account), the total expenditure, and the balance carried to profit and loss account. Thus, for the first time in these returns, both classes of undertakings are put on the same footing. It appears that the total receipts of all the undertakings amounted to £14,928,616, and their total expenditure to £10,304,687, or 69·03 per cent. of the receipts; showing a balance of £4,623,929, or 30·97 per cent. of the receipts, as gross profit. These aggregate amounts are divided between the two classes of undertakings in the following proportions—viz., Local Authorities, 30·11 per cent. of the receipts, 30·68 per cent. of the expenditure, and 28·84 per cent. of the gross profit balance; other than Local Authorities, 69·89 per cent. of the receipts, 69 32 per cent. of the expenditure, and 71·16 per cent. of the gross profit balance. For the Local Authorities, the expenditure was 70·33, and the gross profit balance 29·67 per cent. of the receipts; for other than Local Authorities, 68·46 per cent. of the receipts was absorbed by the expenditure, leaving 31·54 per cent. as gross profit balance.

As regards the practical details of working for the year 1887, there are several matters to be taken into account in order to arrive at anything approaching to accurate results. Thus, the

actual figures, as given in a preceding article (*ante*, p. 114), would show as follows:—That in the employment of the capital amounts named, with receipts and expenditure as given, all the gas undertakings included in the returns carbonized in the aggregate 8,962,831 tons of coal—viz., 2,985,577 tons, or 32·31 per cent. of the total, by the Local Authorities, and 5,977,254 tons, or 66·69 per cent., by other than Local Authorities; that the total make of gas was 91,371,514,000 cubic feet—viz., 30,105,458,000, or 32·95 per cent. of the total, by the Local Authorities, and 61,266,056,000, or 67·05 per cent., by other than Local Authorities (the total sale of gas being 83,658,691,000 cubic feet—viz., 27,418,050,000, or 32·77 per cent., by the Local Authorities, and 56,240,641,000, or 67·23 per cent. by other than Local Authorities); that the distribution was effected through 20,113 miles of mains—viz., Local Authorities, 6602½ miles, or 32·83 per cent. of the whole, and other than Local Authorities, 13,510½ miles, or 67·17 per cent. of the whole; that the total number of private consumers was 2,163,258—for the Local Authorities, 1,011,139, or 46·74 per cent., and for other than Local Authorities, 1,152,119, or 53·26 per cent. of the whole; while supply was given for the lighting of 423,580 public lamps—viz., by Local Authorities, 159,264, or 37·60 per cent., and for the other Local Authorities, 264,316, or 62·40 per cent. of the whole. But the figures are not relatively accurate. For example, the total amounts of capital are unduly swollen by several Companies whereof the works are in course of construction; thus contributing nothing whatever to the columns of receipts and expenditure, coals carbonized, gas made and sold, miles of mains, and number of consumers and public lamps. Further, in regard to these latter, there are numerous cases in which default is made in one or the other, sometimes in more than one, column; all the other particulars being full and complete. Thus, in one case there are no entries of receipts and expenditure; in four cases there is no entry of the make of gas; in five cases the sale of gas is incomplete, there being no entry of the consumption by public lamps; and in no less than 27 cases the length of mains cannot be given. Lastly, one Local Authority buys gas from an adjoining Company, consequently there is no entry of coals carbonized, and its make and sale of gas are redundant, having been entered in their proper place by the supplying Company, so that they are taken twice into account. These complicated corrections having been duly attended to, we are enabled to give the working results with something like an approximation to accuracy—and more than this no one can say who bases his calculations on the Board of Trade returns relating to authorized gas undertakings.

We find that the hypothetical average undertaking had a working capital of £104,127, carbonized 16,237 tons of coal, and made 165,528,105 cubic feet of gas, whereof 151,555,600 cubic feet were sold, supplying (through 36½ miles of mains) the requirements of 3919 private consumers and 767 public lamps. Its gross receipts were £27,247, of which £18,807 were absorbed by the gross working expenditure; leaving a gross profit balance of £8440. The capital represented £6 8s. 1½d. per ton of coal carbonized, 12s. 6½d. per 1000 cubic feet of gas made, and 13s. 8¾d. per 1000 cubic feet of gas sold; being at the rate of £686·26 per million. The make of gas was 10,196, and the sale 9335 cubic feet per ton of coal carbonized; 91·56 per cent. of all the gas made being sold, and 8·44 per cent. covering the loss by leakage and condensation and the gas used on the works. The sale of gas amounted to 4,045,981 cubic feet per mile of mains, or 35,703 cubic feet per consumer and 15,853 cubic feet per public lamp; each mile of mains supplying 102 consumers and 20 public lamps. The gross working expenditure absorbed 69·03 per cent. of the gross receipts; leaving a gross profit balance of 30·97 per cent. The gross receipts amounted to 26·01 per cent. upon the working capital, and were equivalent to 33s. 3¾d. per ton of coal carbonized, 3s. 3¼d. per 1000 cubic feet of gas made, or 3s. 6¾d. per 1000 cubic feet sold. The gross working cost was at the rate of 17·95 per cent. on the capital, 23s. per ton of coal carbonized, 2s. 3½d. per 1000 cubic feet of gas made, or 2s. 5¾d. per 1000 cubic feet sold. The gross profits on the year's working represented 8·06 per cent. on capital, 10s. 3¾d. per ton of coal carbonized, 1s. 0½d. per 1000 feet of gas made, and 1s. 1½d. per 1000 feet sold.

These particulars are based upon the aggregate totals of the two classes of returns; but there are essential differences between the working of the Local Authorities and that of the Companies or "other than Local Authorities." Thus the hypothetical average Local Authority employed a working capital of £119,532, upon the carbonization of 17,771 tons of coal, producing 179,199,155, and selling 163,602,678 cubic feet of gas, which were supplied (through 39 miles of main) to 6019 consumers and 948 public lamps. The gross receipts were £26,757; the expenditure, £18,819; and the gross profits, £7938. Its capital was, therefore, equivalent to £6 14s. 6¾d. per ton of coal carbonized, 13s. 4½d. per 1000 cubic feet of gas made, or 14s. 7¾d. per 1000 cubic feet sold—*i.e.*, £732·48 per million. The gas made amounted to 10,035 cubic feet per ton of coal carbonized, and that sold to 9185 cubic feet—the sale being 91·07 per cent. of the make; leaving 8·93 per cent. as the loss, or unprofitable proportion, including gas used on the works. The gas sold was, therefore, equivalent to 3,933,012 cubic feet per mile of mains, or 25,857 cubic feet per private consumer, in addition to the consumption of 14,545 cubic feet for each public lamp; there being 140 consumers and 22 public lamps per mile of main. The proportion of the gross receipts absorbed by the working cost was 70·33 per cent.; showing 29·67 per cent. as gross profit balance. Gross receipts represented 22·42 per cent. on the capital employed; being at the rate of 30s. 1½d. per ton of coal carbonized, 2s. 11¾d. per 1000 cubic feet of gas made, and 3s. 3½d. per 1000 cubic feet sold. The gross expenditure amounted to 15·77 per cent. upon the capital; representing 21s. 2½d. per ton of coal carbonized, 2s. 1½d. per 1000 cubic feet of gas made, and 2s. 3¾d. per 1000 cubic feet sold. Thus the year's working showed gross profits equivalent to 6·65 per cent. on the working capital, 8s. 11½d. per ton of coal carbonized, 10¾d. per 1000 cubic feet of gas made, or 11¾d. per 1000 cubic feet sold.

The hypothetical average company, on the other hand, disposed of a working capital amounting to £97,387, and carbonized 15,566 tons of coal, with a yield of 159,547,020, and a sale of 146,460,003 cubic feet of gas, distributed (through 35 miles of mains) to 3000 consumers and for the lighting of 688 public lamps. Its total receipts amounted to £27,249, with an expenditure of £18,655; leaving £8594 as gross profits. Consequently, the working capital represented £6 4s. 11½d. per ton of coal carbonized, 12s. 2½d. per 1000 cubic feet of gas made, and 13s. 3½d. per 1000 cubic feet sold—that is, £663·77 per million. Their total make of gas represented 10,251 cubic feet, and their sale 9410 cubic feet per ton of coal carbonized; the latter being 91·80 per cent. of the former, and the loss (inclusive of gas used on the works) being 8·20 per cent. The sale of gas per mile of main was at the rate of 4,098,970 cubic feet, comprising the supply of 45,090 cubic feet to each individual consumer, and of 16,640 cubic feet for the lighting of each public lamp. The proportion of private consumers per mile of main was 83; and of public lamps, 19. Of the total receipts, 68·45 per cent. were absorbed by the working expenditure; and the resulting gross profit balance was 31·55 per cent. The gross receipts were equivalent to 27·96 per cent. upon the working capital, 34s. 11d. per ton of coal carbonized, 3s. 4¾d. per 1000 cubic feet of gas made, or 3s. 8¾d. per 1000 cubic feet sold. The working expenditure represented 19·14 per cent. upon the capital, 23s. 10¾d. per ton of coal carbonized, 2s. 4d. per 1000 cubic feet of gas made, and 2s. 6½d. per 1000 cubic feet sold. Therefore, the gross profits amounted to 8·82 per cent. on the capital employed, and were at the rate of 11s. 0½d. per ton of coal carbonized, 1s. 0¾d. per 1000 cubic feet of gas made, or 1s. 2d. per 1000 cubic feet sold.

Noting the chief points of difference between these two parallel series of results, it is not as easy as some theorists believe to make definite comparisons between them, whether to the advantage or the disadvantage of the Local Authorities or the Companies, in the absence of detailed information under some of the heads. It is only on certain points that the indications are unmistakable. For instance, as to working capital, the average Local Authority employs 9½ per cent. more capital per 1000 cubic feet of gas sold than the average Company; whereas (for the same unit) the latter obtains 32·63 per cent. higher returns in the shape of gross profits. Again, the average Company makes 1·65 per cent., and sells 2·42 per cent. more gas per ton of coal carbonized than does the average Local Authority; the latter's loss (per cent. on the total make) being higher by 8·90 per cent., while, on the other hand, the area covered by the operations is very much more concentrated, as it serves, per mile of main, 68·67 per cent. more consumers and 15·79 per cent. more public lamps than the former—no unimportant advantage, alike as regards capital outlay, depreciation in quality of gas, and loss by leakage and condensation. Beyond these general comparisons, there is very little tangible. *Primâ facie*, no doubt, it

Particulars, 1887-8.	Local Authorities.		Companies.		All Undertakings.	
	As in Returns.	Corrected for Doubtful Cases.	As in Returns.	Corrected for Doubtful Cases.	As in Returns.	Corrected for Doubtful Cases.
Capital per ton of coal	£6·728	£6·700	£6·246	£6·184	£6·406	£6·335
„ per 1000 feet of gas sold	14s. 7·80d.	14s. 7·12d.	13s. 3·30d.	13s. 0·77d.	13s. 8·70d.	13s. 6·82d.
Receipts, per cent. on capital	22·42	22·44	27·96	28·21	26·01	26·17
Expenses „ „	15·77	15·79	19·14	19·35	17·95	18·09
Profits „ „	6·65	6·65	8·82	8·86	8·06	8·08
Receipts per ton of coal	30s. 1·27d.	30s. 0·96d.	34s. 11·07d.	34s. 8·45d.	33s. 3·85d.	33s. 1·80d.
Expenses „ „	21 2·09	21 1·99	23 10·91	23 9·66	23 0·00	22 11·01
Profits „ „	8 11·18	8 10·97	11 0·16	10 10·79	10 3·85	10 2·79
Receipts per 1000 feet of gas sold	3s. 3·92d.	3s. 3·31d.	3s. 8·54d.	3s. 8·23d.	3s. 6·83d.	3s. 6·60d.
Expenses „ „ „	2 3·65	2 3·66	2 6·49	2 6·34	2 5·56	2 5·45
Profits „ „ „	0 11·67	0 11·65	1 2·05	1 1·89	1 1·27	1 1·15

may be said, in regard to receipts, expenses, and gross profits, that the average Company receives 5¼d. spends 2⅞d., and makes a gross profit of 2⅜d. more per 1000 cubic feet of gas sold than does the average Local Authority; but it is by no means obvious what are the correct conclusions to be drawn from these bare facts, or where the advantage or disadvantage respectively lies. The sole condition, under which such a simple comparison could be accurate would be that none but similar items, similarly treated, appear in the accounts whence it is derived. It may, however, be very confidently asserted that the actual conditions are the very reverse. Under the head of "Depreciation" alone—its relative amount, and whether chargeable to revenue accounts or net revenue—what a wide range of divergence exists in theory and practice! We are disposed to think that, as a general rule, in the returns under review, depreciation forms part of the working expenditure of the Companies, but not so with the Local Authorities. Then, again, there are expenses of management incurred by the Companies and not by the Local Authorities; so that an excess of 2d. or 3d. per 1000 cubic feet of gas sold may easily be accounted for. Similarly, on the other side of the account, a few pence per 1000 feet in the receipts are easily gained or lost by an adequate or inadequate realization from residuals; so that a small excess in receipts does not necessarily imply a higher price of gas. It does not, therefore, suffice to point to the fact that the hypothetical average Company spent 2s. 8¾d. more per ton of coal carbonized than the hypothetical average Local Authority, as an argument in favour of working gas undertakings by Local Authorities.

The question is many-sided, and cannot fairly be judged from any single standpoint; but if there be any one standpoint to which preference may or should be assigned, it can only be the *ultima ratio* of interest upon capital outlay yielded by gross profits; and in this respect the verdict must unhesitatingly be given in favour of the Companies and against the Local Authorities. We may say, further, that the result would be more favourable to the former if it were possible to eliminate from the returns all the items which are foreign to their subject-matter—gas. In default of the means and information requisite to this end, we have deduced the foregoing results from the statistics given in the returns. There are, however, numerous instances where gas and water (or other) undertakings are combined. Of these, in five cases—four Companies at Aldershot, Ventnor, Pontypool, and Lowestoft; and one Local Authority at Bangor—it is distinctly stated that the entire return relates to the combined undertakings. In most cases, the simple notification is given that the capital (only) is "for gas and water" or "various purposes," as the case may be, whence the accounts of receipts and expenditure presumably relate to the gas undertaking only; whereas actually this is extremely doubtful. In one prominent instance—that of the Bournemouth Gas and Water Company—the entire return, on the face of it, and for anything that appears to the contrary, relates solely to gas; yet, with the price of gas at only 3s. 10d. per 1000 cubic feet, the total receipts are 7s. 3½d. per 1000. It is therefore pretty evident that the accounts relate to gas and water jointly; and this is confirmed by the fact that, from the figures and particulars given in the returns, a liberal estimate of the receipts would place them at £24,000, whereas they are stated at £37,000, or upwards of 50 per cent. more. There are also eleven other Companies where, for similar reasons, it seems doubtful whether the accounts do not relate to both water and gas, though not so stated. Making a hypothetical correction, by omitting from the returns all these doubtful cases, we obtain results somewhat different to those before given, with which they are set down side by side, for the sake of comparison, in the table on p. 1037.

The differences are not immaterial because they may seem small; that being due solely to the smallness of the unit to which the figures are reduced—viz., their relation to the ton of coal carbonized and to the 1000 cubic feet of gas sold. As a practical illustration of their effect, we note that they show that the hypothetical average Local Authority employs, not 9½ per cent., or 16·50d. more capital per 1000 cubic feet of gas sold, than its fellow Company, but 18·35d., or 11·7 per cent. more; and similarly, that the latter's gross profits represent, as interest on working capital, 8·86 per cent. against 6·65 per cent. for the former—in lieu of 8·82 per cent.—showing a return of 33·23 per cent., and not merely 32·63 per cent., greater.

Other general features of interest in the returns, as well as individual examples of excellent working, or the reverse, of extreme cases, and of curious contrasts, require special notice, which must be reserved for a subsequent article.

The Brussels Chamber of Deputies have passed a Bill imposing an import duty of 140 frs. per kilogramme on saccharine.

Among the honours conferred by Her Majesty on the occasion of her birthday was a baronetcy on Professor Stokes, M.P., the President of the Royal Society.

In Mr. Dibdin's last return to the London County Council on the quality of the gas supplied in the Metropolis, there was but one record of deficiency in illuminating power, and that to the extent of only 0·1 candle.

We have received from Messrs. Lancaster and Tonge, Engineers, of Pendleton, Manchester, a supplement to their catalogue of specialties, among which may be mentioned the "serpent" coil piston, the spiral spring piston, and the feed-water heater.

PYROLOGY.

In the course of an article upon "Furnaces" which we published a fortnight ago, some reference was made to "that department of practical science which may almost be regarded as worthy of a special name, in order to signify the art and practice of firing, stoking, furnace management, design, and construction." It is our present intention to consider this idea at greater length with a view to the elucidation of its meaning. It is obvious that the combustion of fuel in some sort of furnace is one of the fundamentals of an immense number and variety of modern industries. The relative importance of the furnace to the other appliances used in the industry varies through a very wide range, from some in which it is the principal care of the manufacturer, to others in which it occupies a minor position. At the last point it vanishes in the cylinder of the gas-engine. There are few industries in which the furnace plays a more important part than in gas manufacture; although there are many others in which the application of heat to manufacturing processes is on a larger scale. The combustion of fuel for steam raising is a large division of the general subject; and the special peculiarities of steam-boiler furnaces are traceable, with more or less modification, in a number of other applications. Gas-retort furnaces likewise constitute a class by themselves, although closely allied to glass-melting furnaces. Then there is the large class of furnaces in which the furnace proper is merged into the manufacturing plant, as in blast-furnaces, cupolas, and, in a distinct subdivision, brick and lime kilns. Through all these specialized developments of the furnace there runs a continuous connection which enables us to realize that herein is a point of contact between marine and milling engineers, gas engineers, glass makers, brick burners, and iron masters—they are all interested in the study of furnaces, and in the efficient and economical combustion of fuel. Now there is but one kind of fuel in the world—carbon in some form, qualified very often with some hydrogen. The combustion of fuel is essentially merely the oxidation of carbon and hydrogen; and the question which all fuel users are engaged in solving, according to their lights and opportunities, is the conduct of this process in the manner most convenient for their own special purposes. There is so much similarity in the operations of fuel utilization—the same principles are universally recognized, and at the same time the difficulties and practical requirements are so various—that we are disposed to think that the whole body of theory and practice in this matter might advantageously be regarded as a speciality, and called (say) by the distinctive name of "Pyrology."

This is not a new word; but what we suggest is a novel and specialized application of it which will not clash with any other. As a matter of fact, although the term "pyrology" is included in dictionaries as signifying the science of heat, it is never used. The only difference our suggestion makes in the meaning of the word lies in the substitution of fire for heat in the etymology, as is the case with the closely allied term "pyrotechny." The idea of pyrology which we seek to convey is that of a science of fire in theory and practice. The theory would embrace considerations of the nature of fire, flame, and incandescence as phenomena distinguished from slow oxidation. Practically, the science would involve all considerations of the treatment of fire for useful purposes. The pyrologist would be the man who in the ranks of mechanical engineering thinks more of the boiler fire, while his professional brother is occupied with link motions and balanced valves. The gas manager would be a pyrologist when his desire is towards furnaces rather than purifiers or the puzzles of holder construction. Thus it may be seen that there would be pyrologists of many shades, who would yet posses much in common. In gas engineering, for example, there are men of various tendencies. Some are chemists for choice; and to these there is no pursuit in the range of their professional studies more alluring than the chase of the mysterious sulphur compounds from purifier to purifier, until at last they run them home. These worthy gentlemen look upon the work of the retort-house and the occasional necessity for designing new structures as evils to be endured; for to their mind the problem of gas making for the future is only that of the reduction of the last elusive trace of chemical impurity. Other gas managers, we are fain to admit, jeer at chemists as useless pedants when they are not actively mischievous troublers of the public mind, and think there is nothing in gas engineering so engrossing as the problems of dealing in the most economical way with heavy raw materials, and establishing the principles of gasholder stability. As, however, a good gas manager should be a good carbonizer to begin with, there are naturally many pyrologists among them. These are the men who have worked out the problem of generator firing for themselves, and who are not dismayed when occasion arises for changing the form of their principal fuel from solid to fluid. A good pyrologist has in him many of the makings of a good gas manager; but we would not for a moment pretend that pyrology is the only study for a student of gas manufacture.

A gas manager who is interested and expert in pyrology has affinities with pyrologists on all sides of him. He watches the progress of invention in steam-boiler furnaces, with respect to which he has ideas of his own, and the practical aspect of the smoke abatement movement engages his sympathy; so that when in winter he sits beside his own blazing hearth, he can scarcely look at the fire without wondering how it could be made to burn smokelessly always. It is in regard to the great generator furnace question, however, that pyrologists of all varieties join hands. The engineer who has proved the efficacy of a gas-furnace for his own special requirements usually entertains the firm conviction that the

same principle can be advantageously applied to almost all purposes within the realm of pyrology. Accordingly, he remodels brick and lime kilns, and secures triumphs in applications for which gaseous firing would never have been attempted but for the successes of others. A pyrologist who has gained his experience in one school is often able to throw fresh light upon the difficulties of others differently trained; receiving assistance in kind by way of recompense. It does not matter what may be the immediate object of a new form of furnace or method of using fuel, the pyrologist will take note of it for its own sake, certain that it will turn out to be useful to him in some way if there is any real good in it. He may classify himself as a marine, a mechanical, or a gas engineer, as a lime burner, a fire-brick maker, or an iron founder; it makes no difference to the interest with which he watches a device for mechanical stoking, or listens to a fresh exposition of the theory of flame.

If it were needed to illustrate the science of pyrology by citing its most prominent professor, we should name Mr. Frederick Siemens. Whoever has followed Mr. Siemens's working with fire and flame requires no better instruction as to what is comprised under the name of pyrology. There are plenty of other men eminent in this line; but, without wishing to draw invidious comparisons, or attempting to magnify Mr. Siemens at the expense of others, it is open for us to point to him as an exemplar of modern pyrology. And how infinitely has the work of pyrologists affected the development of modern industry! Very few manufactories remain in the same state as they are to be found described in the old-fashioned technical manuals, which, because they are to be had cheaply at second hand, constitute a large proportion of the libraries of engineering students who have to rely mainly upon their own resources; and nothing is more changed in most of them than the furnaces. In the iron industry alone it is known that the fuel burnt is made to perform three times the work it formerly did; and the same may be said of many other applications of fuel. All this involves the idea of a great study of the problems connected with firing, and prepares us for the discovery of a trustworthy body of accumulated experience which it is the first task of the would-be pyrologist to master, as it is the second to increase.

It would, of course, be impossible, in the space at our command, to state all, or even a part, of the canons of the special science; and unfortunately we cannot name any single book in which they may be found. There is a good deal of pyrology, of course, in all works on "Heat," and Box's well-known book, imperfect as it is, has opened this particular study to many inquiring minds. Books on mechanical engineering, and also the numerous handbooks of special industries, contain chapters devoted to pyrology; and from all these, read by the light of memoirs contributed by eminent pyrologists to learned societies, a fair elementary idea of the subject may be obtained. The true pyrologist, however, must be more than a bookman. He takes account of the phenomena presented by all furnaces from the simplest to the most elaborate. He modifies this feature and that, with a view to a certain result; and marks the consequences, whether anticipated or incidental. The effects of hot or cold air, when admitted at different parts of a furnace, the times and conditions of feeding up, clinkering, damping down—he must know them all, and a great deal more that we cannot mention here. The glare on its own steam cloud at night from the wide-open furnace door of a passing locomotive engine is a lesson in pyrology; and if a man can fairly understand and expound it he is not far from being an adept. The deepest teachings in the science are sometimes revealed by apparently simple observations. It has long been known that a deposit of soot from a bright flame will result from putting a cold metallic surface into it; but it is only lately that it has come to be understood that a flame, whether liable to deposit carbon as soot or not, does not touch any surface without losing some of its power.

Recently intelligence of a wonderful triumph of pyrology has come from America, where it is said, some genius has invented a stove, which with hardly any fuel, gets up heat enough to melt iron, and creates enough draught to propel a ship. The stove is described as having exactly the appearance of a "cast-iron hat;" and it is reported to be doing such wonders that men of science are afraid to look at it lest all their acquired knowledge of combustion, &c., should be blown away, and they left shivering like naked fledgelings in a world of new experience. Where are the pyrologists of the favoured neighbourhood? How often has the silly story been circulated of the ignorant but heaven-born inventor who knocks down at a touch all the nonsensical science of the colleges and engineers' offices! but somehow the artless newspaper man who spreads the rumour usually sees the first and last of the untaught genius. Mr. Edward Fales, of Philadelphia, is the reputed discoverer of this new principle in pyrology; and one can only say that if the local "alleged scientists," as the *American Engineer* calls them, "are afraid to come near it," let him send one over here, where scientific observers are generally of a stouter fibre. We can promise Mr. Fales fair play; and can engage that nothing would afford us greater pleasure than the new sensation which he believes the educated people of Philadelphia cannot endure. In pyrology, however, as in other sciences and other pursuits of men, the presumption is that what has been is that which shall be, and that the so-called new principle is simply nothing at all. We would not say, of course, that nothing new is to be looked for in pyrology. On the contrary, we hope that although principles may stand fast, novel and desirable applications may be more plentiful than ever when pyrology is recognized as a distinct science. Only a very ignorant and conceited person, however, could expect to find anything in this or any other department of human effort that will enable him to laugh in the faces of the wise and experienced men whose lives have been devoted to the science.

The Strain on Bent Pipes.—Experiments recently made on the strength of bent pipes have developed some things not commonly known, or at least not recognized in reference to the strain on the inside of the angles, due to the efforts of the pipes to straighten themselves under pressure. The problem is one of considerable intricacy—resolvable, however, by computation; and it is a good one for practice by engineering students. In the experiments referred to, a copper pipe of 6¾-inch bore, $\frac{1}{16}$ inch thick, was used. The angle was 90°; and the legs were about 16 inches long from the centre. At a pressure of 912 lbs. to an inch, the deflection of the pipe was nearly ¾ inch; showing an enormous strain on the inner side, in addition to the pressure.

Lighting Railway Carriages by Electricity.—Last Wednesday night the Midland Railway Company began to use the electric light on their system; the light being employed for the first time on the London and Manchester and Liverpool express. The dynamos are situated in the rear guard's van; the driving-gear being attached to the axle of the front pair of wheels. The speed of the dynamos was found to be very quickly and easily regulated; and in the run from London to Leicester, the light was quite steady and brilliant. During the stoppage of the train to change engines, the light was perfectly maintained by the accumulators. The lamps are each of 8-candle power. In some of the carriages there were two lamps, both in the roof; in others there were four, two on either side of the carriage.

The Electric Lighting Scheme for Brussels.—The Brussels correspondent of *Industries* states that numerous tenders have been received for the electric lighting scheme of the Brussels Municipality, to which reference has already been made in our columns; and American offers have been received, which he says are exceedingly low. It appears, however, that the town will reserve its final decision, and that the July contracts will only be in the nature of a trial. The Municipality are not entirely agreed as to whether it is advisable at present to launch into expenses for a large installation. Private influences are also at work. There is therefore but little of technical interest remaining in the matter. In the meantime, according to the same authority, gas is regaining its ground, as some small isolated installations have not turned out satisfactorily. At a recent gas exhibition held in the city, there were no fewer than twelve regenerative gas-lamps shown. Another light has recently made its appearance there, and has attracted considerable attention owing to its small consumption of gas compared with its illuminating power.

The Bacteriological Examination of Water.—In the course of a review of the work on the "Examination of Water for Sanitary and Technical Purposes," by Messrs. H. Leffmann and W. Beam, which has lately been issued by Messrs. P. Blakiston, Son, and Co., of Philadelphia, the *Chemical News* points out that the authors enter but slightly into the question of the presence of living organisms in water; rightly judging that bacteriological examination is as yet of uncertain value as regards the potability of water. Upon the purification of water supplies, however, the authors, we are told, express very sound views. They admit, with Dr. Frankland, that carbon filters sometimes seem to act as a hotbed for the development of microbia. Stone and sand filters they regard as worthless—that is, for the elimination of living organisms. Spongy iron was found to reduce the microbia by about one-half in the best cases; but the unglazed porcelain filters on M. Pasteur's principle, and also the asbestos filters, give a filtrate practically free from micro-organisms. They quote from Dr. Percy F. Frankland's important results as to the removal of organized matter from water both by agitation with finely-divided absorbent solids and by precipitation. From their own observations they state that a precipitate of aluminium or of ferric hydroxide carries down with it all suspended matters as a large proportion of the dissolved organic matters.

Mr. W. Foulis on Water Gas.—Mr. W. Foulis, the General Manager of the Glasgow Corporation Gas-Works, has lately, at the request of the Works Sub-Committee, inspected the plant in use at the Leeds Forge for the manufacture of water gas; and has just reported thereon to the Sub-Committee. He explains the nature of the gas, the method of its manufacture, and the arrangement by which it is utilized as an illuminant, and concludes his report as follows:—"So far as I have been able to estimate, assuming no increase in the price of coke or anthracite coal, non-illuminating water gas could not be manufactured and distributed through any length of mains, and sold so as to yield a profit, at a less price than 1s. 9d. to 2s. per 1000 cubic feet, and for either heating or lighting purposes a much larger quantity of gas would require to be consumed than with coal gas. To make it practically useful for the purposes of a town supply, it would require to be carburetted, as is done in America; and this would raise the cost of production much above that of coal gas. A serious objection to the use of water gas in towns is the poisonous character of the carbonic oxide gas it contains, a very small quantity of which is sufficient to produce a fatal result. In my opinion, in this country, and under existing circumstances, water gas, whether supplied in its non-illuminating form or carburetted, cannot compete with coal gas, either as regards efficiency or economy, for the general purposes of a town supply."

Notes.

Cyanogen and its Compounds in the Products of the Distillation of Coal.

It has been known for years that cyanogen and cyanogen compounds are found in the products of the distillation of coal; and, on account of their commercial value, it is of interest to ascertain the mode of their formation and at what stage of the production of gas they may be sought for. At the meeting of the Société Technique last year, M. Pendrié set before his colleagues the results of an examination of various products of, and materials used in coal distillation, taken at various periods of their production or application. He estimated the sulphocyanic and hydrocyanic acids in the ammoniacal liquor, by precipitating them together as silver salts; determining the sulphur present as sulphuretted hydrogen, by titration with decinormal zinc solution, and the total sulphur, by oxidation and weighing as barium sulphate—the difference between the two sulphur determinations giving the sulphur present as sulphocyanic acid. The quantity of sulphocyanic acid thus found was deducted from the amount of hydrocyanic and sulphocyanic acids as found by weighing the silver salts. From the mass of purifying material the sulphocyanic acid was first removed by water, and the hydrocyanic acid obtained, by decomposing the Prussian blue (in which form it would be) with caustic soda; each being ultimately weighed, as before, as silver salts. These methods could not be employed if the coal contained chlorine. M. Pendrié's results lead him to the conclusion that during the distillation of coal part of the ammonia is always converted into cyanogen, which is found in the products of distillation as salts of hydrocyanic and sulphocyanic acids; the greater part being retained by the ammoniacal liquor, and the smaller proportion going into the purifying material, where it is chiefly present as sulphocyanide. If a tonne (2200 lbs.) of coal yields 100 litres of gas liquor, and 300 cubic metres of gas, then it is calculated that there will be 313·2 grains of cyanogen in the ammoniacal liquor, and 189·3 grains in the purifying materials, for each tonne of coal. Nitrogen in the form of Prussian blue or cyanides is more valuable than in the form of ammonia; and as the cyanogen in the gas liquors could be easily transformed into these substances, it is suggested that, with this object in view, the gas liquor should be collected and treated separately. Theoretically, half the ammonia formed could be converted into cyanogen by reacting with the carbon in the retort in the following manner:—

$$\underset{\text{carbon}}{C} + \underset{\text{ammonia}}{4\,NH_3} = \underset{\text{ammonium cyanide}}{2CN\,(NH_4)} + \underset{\text{hydrogen}}{2H_2}$$

and it is considered that a practical method of realizing this in the works would be valuable. It must be remembered, a German critic points out, that cyanogen compounds are not so much in demand as ammonia salts; and that an increase in their production would soon bring the price down.

A Cheap Thermostat.

Gas thermostats for regulating the heat of rooms, tanks, &c., to a constant temperature, are commonly more or less complicated arrangements of mercury seals; but a particularly neat little apparatus for effecting the same purpose is being introduced by the Patent Automatic Heat Regulator Company, of Weaman Street, Birmingham. It consists of a sensitive bulb of metal, mounted on a valve through which the flow of gas passes, the whole having the general appearance of a door knob fixed upon a Carter's valve, and intended to be exposed to the temperature which is to be controlled by it. For regulating a gas-fire in an apartment, the instrument is fixed by a simple clip to the wall by the side of the chimney piece, or in any other convenient position, at a height of about 3 feet from the floor, the circular head hanging downwards. Two short pipes are required for the gas connection; the regulator being interposed between the stop-tap and the gas-burners. To adjust it the full supply is turned on, and the instrument set to the required temperature by a screw provided for the purpose. The fire will then always burn at its maximum power when lighted, but as soon as the temperature of the air rises to that at which the regulator is set, the flow of gas will be checked, to rise again if the temperature should fall. For lacquering stoves, the regulator is placed with its face upon the top of the stove, so as to be in contact with the surface to be controlled. For urns, vats, &c., a hole is made in the side of the vessel and the regulator inserted with its head inside, and screwed up tight with a washer on the neck; or it may be suspended in the interior by means of a flexible tube connection. Different patterns of the instrument are made for a variety of uses, and also for different ranges of temperature.

The Photometry of Electric Arc Lamps.

A memoir upon the photometry of electric arc lamps was recently read by Dr. W. Wedding before the Berlin Society for the Promotion of Technical Industry. The author remarks that the true luminous intensity of lamps of this class has not yet been determined. Such lamps as those employed for lighting Unter den Linden have been credited with various degrees of brilliancy ranging from 5000 to as little as 500 candles; and the public of Berlin were so exercised on the point that Dr. Wedding was commissioned to settle the question. The lamps in question are of the well-known Siemens differential type, and a sample one was fitted up in Dr. Wedding's laboratory for the purpose of testing. Elster's modification of the Bunsen photometer was used; and the tests were made at different angles and without mirrors. The unit of light employed as the basis of measurement was the German normal candle, with a flame 45 mm. high. The regulation height of flame for these candles is 50 mm., but at this height it burns unsteadily; while at a height of 45 mm. the flame is much more steady, giving exactly as much light as the English standard candle. It being practically impossible to compare the arc light directly with the candle, an intermediate standard of comparison was sought for. The main difficulty in the matter arises from the difference in the colour of the lights to be compared. The light of the arc lamp appears white to our eyes, while that of candles or gas-flames is yellow or red. Therefore in the photometer, by comparison of these different lights, the unpleasant effect is produced of the grease spot appearing red on one side and blue on the other, instead of disappearing as when two lights of the same hue are compared. The observer is therefore compelled to determine when the outlines of the spots appear equally indistinct, to do which and ignore the colours is rendered possible by practice. The intermediate standard selected by Dr. Wedding was a pair of "Albert" gas-burners, each giving a steady clear light of from 25 to 30 candle power and provided with a meter and governor. In the testing process the two gas-burners were first made to give exactly the same light, and then one was screened off until the illuminating power of the other was accurately determined from the standard candle. Then the observation of the arc lamp was begun, the strength of the electric current being maintained as regular as possible. From these tests it was deduced that the average illuminating power of the arc lamps in Unter den Linden, when fitted in the ordinary way with globes and reflectors, is only 510 candles. These lamps are rated for a current of from 14 to 15 ampères and an E.M.F. of from 48 to 52 volts.

The Corrosion of Iron in Structures and in Store.

In the course of his inaugural address as President of the Institution of Mechanical Engineers, Mr. Charles Cochrane drew attention to the deterioration of wrought iron when exposed to the influence of rain water, as being specially exhibited in bridges constructed on the Thames, the waste in which he regarded as aggravated by the acid condition of the atmosphere due to the presence of sulphurous acid from the combustion of coal as well as to the customary percentage of carbonic acid. In the course of twenty-five years bolts have been eaten away from an original diameter of $\frac{3}{4}$ inch to one of $\frac{7}{16}$ inch, being a reduction in area of 75 per cent., or from 0·31 to 0·08 square inch, and this in a portion of the structure where the brackets of an overhanging footpath were supported in part by the decaying bolts. Wherever the rain trickled over the face of the girders to which the brackets were attached, the same evidence of deterioration was manifested in the scaling of the plates; pointing both to the necessity of preventing water from coming into contact with wrought iron, and of periodically examining and painting structures of this material. Another illustration of insidious destruction of iron was named. This was the case of a wire rope at a colliery, kept in reserve to wind men up and down the shaft in case of ropes breaking or of other accident preventing the due use of the winding shaft. While at rest the emergency rope was subject to the drip of rain at the same spot for some years, from the roof of the engine-house. External examination was strict, and the rope was regularly greased as is customary. At length a man riding up the shaft was killed through the parting of the rope at the point exposed to the rain drip, and the wires internally were found to have been corroded the size of drawn-out needle points. Mr. Cochrane cited other instances of the decay of materials in store through small but continuously acting causes of corrosion.

Successful Artesian Borings.—A very good supply of water has lately been found at Harlington, near Hounslow, for the use of the Metropolitan Police. A 5-inch boring has been carried down to the depth of 292 feet; and at this depth the chalk was reached. After boring a further depth of 40 feet into the chalk, the water rose 9 feet above the surface, and continues to flow at the rate of 16 gallons per minute. The supply has been tested; and it cannot be lowered more than 10 feet from the surface, and is equal at this level to 250,000 gallons per day. The work has been carried out by Messrs. W. Brown and Son, of Tottenham, under the direction of Mr. John Butler, Surveyor to the Metropolitan Police. *Indian Engineering* reports that a tube well 250 feet deep has been sunk at a mill in Pazundaung, and three others on the Dabaung side of the Pazundaung Creek, both near Rangoon. The supply of water from these is excellent.

A New Joint-Making Material.—A permanent and durable joint can, it is said, be made between rough cast-iron surfaces by the use of mineral asbestos mixed with sufficient white lead to make a very stiff putty. This will resist any amount of heat, and is unaffected by steam or water. It has been employed for mending or closing cracks in cast-iron retorts used in the distillation of oil and gas from cannel coal. The heat being applied to the bottom of the retorts, and the temperature of the iron maintained at a bright red heat, after a time the bottom of the retort would give way; the larger portion of the crack being downwards towards the fire. The method employed was to prepare the mixture, and place it on the top of a brick; then put the brick on a bar of iron or shovel, and press the cement upward to fill the crack in the iron, holding it for some time until it had penetrated the cavity, and somewhat set. Of course, during this operation, the lid was removed from the retort, so that no pressure of gas or oil forced the cement outward until set.

Technical Record.

THE GAS INSTITUTE.

Annual Report, June, 1889.

In presenting the report for the year ending June, 1889, the Council must, in the first place, refer you to the circulars forwarded during the past year for a record of their policy and proceedings.

Doubtless you will remember that at the last general meeting, in June, 1881, a resolution affecting the membership of Mr. Bray was declared carried by the then President. Mr. Bray, being of opinion that an illegal act had been committed, served writs upon the Council, demanding to be reinstated in his membership. Up to this time the Council had been advised that they had a good case; but when the matter was placed in the hands of high legal authorities, they were advised not to defend the action, but to submit to an injunction to reinstate Mr. Bray, and to pay all costs. This was done by the whole Council; and no doubt you are fully aware of the resignations which took place as the result. Subsequently to this, on Dec. 11 last, a resolution was submitted to the Council—"That the Institute be wound up;" and as this resolution was not carried, the President and other members, being the minority, together with the Secretary, also resigned, leaving six members of Council only to manage the affairs of the Institute.

The majority of the Council in voting against the "winding-up," were actuated by a desire to carry out the trust you gave them, in holding the Institute intact until your next June meeting. Under these circumstances, the Council appointed Mr. Garnett and Mr. Longworth as acting President and Secretary respectively; in addition to which, they secured the services of Mr. Radcliffe, the Solicitor to the Institution of Civil Engineers, under whose advice the Council have since acted throughout.

Though the task has been by no means as light as would have been the case had the seceding members of the Council remained at their post, still the letters of approval received from members from all parts of the United Kingdom have encouraged your Council in the policy they have pursued.

Having carried on the business of the Institute so far, the matter is now in the hands of the members to determine its future.

Notwithstanding a desire to leave the members unfettered, your Council have thought it advisable to submit a scheme for improving the constitution of the Institute; and, with this object, have drafted an amended list of rules,* and the substance of a resolution (copy of which has been sent you), which they hope may form a basis for placing the Institute on a good and solid foundation.

In submitting these to the consideration of the members, the Council disavow all desire or intention to offend any member affected thereby, and hope that, by having placed the same before you at so early a date, you will have had ample time to mature such amendments as you may deem necessary, and thus minimize the time which would otherwise be occupied with this matter at the general meeting.

In April last, the President of the Société Technique de l'Industrie du Gaz en France sent a cordial invitation for the members to attend their gas congress in Paris, on June 11, 12, 13, and 14, 1889. As this happens to be Whit-week, and the annual meetings having been already fixed for the 18, 19, and 20 of June, the Council were unable to accept the invitation for the date named. Notwithstanding this, the Council feel sure that the members of The Gas Institute highly appreciate the kindness of their French brethren. As many members have signified their desire to visit Paris, it is proposed to do so at the conclusion of the meetings in London; and arrangements are being made for an inspection of the Parisian Gas-Works and other objects of interest.

The funds of the Institute are in a satisfactory condition, considering the large drafts for legal proceedings last year; and the Council are confident that the various reforms already effected in matters of account will result in a considerable saving in the future.

At the last general meeting, twenty-six members were struck off the roll for non-payment of subscriptions; six associate members and three associates were transferred to the class of members.

The following are the members who have been removed by death:—

Collett, T.	Dudley.
Chambers, W. H.	Lowestoft.
Leather, S. P.	Burnley.
Pazzani, J.	Amsterdam.
Rutter, J. O. N.	Brighton.
Smith, J. H.	Sutton-in-Ashfield.
Spice, R. P.	London.
Vautier, E.	Lyons.
Wallace, Dr.	Glasgow.
Whitaker, Paul	Bradford.

The late Mr. Spice was a Past-President of the Institute; and your Council greatly deplore his loss. His cheering letters to the Council, thoroughly approving of their late action, were of great service and highly esteemed. His death was quite unexpected, as only three days prior he sent a letter to the Honorary Secretary expressing the pleasure he would have in accepting the office of a Trustee, at the request of the President, *pro. tem.*, and the Council. Every member who knew Mr. Spice will join in lamenting his loss, for a kinder heart never beat; and it is with sincer sorrow that the Council have to report his decease.

The Council further have to report that, in consequence of the withdrawal of the members of the Finance Committee who were elected at the last annual general meeting, there being no power in the existing rules for election of other members to supply their place until the next succeeding annual general meeting, they have been compelled, in order to carry on the business of the Institute, to appoint three of their number to act as a Finance Committee, *pro. tem.*; and they now ask the members of the Institute to ratify their proceedings in so doing.

Total number of members in comparison with last year:—

	1889.	1888.
Honorary members	20	22
Ordinary members	529	606
Extraordinary members	56	60
Associate members	31	31
Associates	84	104
	720	823

The Council have decided to award the Birmingham Medal this year, as notified in a circular recently sent to you.

George Garnett, President *pro tem.*
William Longworth, Hon. Sec. *pro tem.*

Guildford, June, 1889.

* See Journal, April 9, pp. 660-661.

The Programme of the Annual Meeting.

The usual admission card, containing the programme of the proceedings at the annual general meeting, has been issued by Mr. W. Longworth, the Honorary Secretary *pro tem.* It commences with a notification that the meeting will be held *pro formâ* at the Ship Hotel, Brighton, on the 17th inst., at noon, and then adjourned to the Institution of Civil Engineers on the next and two following days, at eleven o'clock. There is a second notice to the effect that immediately after the confirmation of the minutes, the presentation of the above report, and the election of officers and new members, on the 18th inst., the meeting will be declared extraordinary, for the purpose of electing new Trustees, dealing with "every extraordinary and ordinary member whose qualification is not in strict accordance with rule 3 of the existing rules of the Institute," and considering the Council's propositions for altering the rules. After these matters have been disposed of, the rest of the business will be proceeded with. This will consist mainly of reading and discussing the following papers:—

"On the Construction, Setting, and Working of Gas-Retorts, and on the Pipe Appendages connected therewith," by George Anderson, London.

"Experience in the Manufacture of Oxygen in Gas-Works, and the Result of its Practical Application to the Purification of Coal Gas," by W. A. Valon, Ramsgate.

"A History of a Heap of Oxide," by Norton H. Humphrys, Salisbury.

"Purifiers," by George Anderson, London.

There will be a midday adjournment for an hour each day. At the close of the ordinary business on the 18th, there will be a meeting of the donors and subscribers to the Benevolent Fund.

Register of Patents.

Apparatus for Producing Light.—Methven, J., of Nine Elms, London. No. 6923; May 9, 1888. [6d.]

The claims for this invention—a general description of which appeared in the Journal for Oct. 16 last year, p. 672—are: 1. The application to apparatus for producing light, from which the external air is excluded, of a dried air supply obtained by forcing air through or over quicklime or other suitable desiccating material. 2. Controlling the supply to lamps of air which has been dried, by forcing it through or over a desiccating material, whereby a constant standard of light is obtained, irrespective of barometric and thermometric conditions.

In the specification for the invention (which is not illustrated), the patentee remarks that the production of light in lamps, lanterns, and other apparatus from the combustion of coal gas is greatly improved by the use of dried air to support combustion. The hygrometric state of the atmosphere varies from hour to hour; and the presence, under ordinary circumstances, of water vapour in the air which is intended to support combustion, cools the flame, and reduces its photometric value. This may be accounted for by the fact that much of the oxygen required to support combustion is held in combination with the other constituents of the moisture, which moisture, when it comes into contact with the flame, passes off as steam, without having parted with its oxygen, leaving an insufficient supply of oxygen in the air which accompanied it to properly combine with, and consume the illuminating constituent—viz., the carbon—thereby giving a comparatively smoky flame, and, as a consequent result, decreased development of light. Now, when the air has been dried, the connecting or retaining link (the moisture) between the constituent parts—the oxygen and nitrogen—is removed; the constituent parts are released from cohesion; and the oxygen is free to combine with the carbon of the gas, thereby raising the heat of the flame, and producing practically perfect combustion, with considerable increase in the illuminating power of the flame. The amount of light given will be of constant power, as it will be independent of the varying hygrometric conditions of the atmosphere, so that a light supplied with the dry air is especially useful for photometric purposes. In addition to the air, the combustible material may, if desired, be also dried; the effect being to further increase the illuminating power of the flame.

In order to effect the desiccation of the air, it is forced over or through the desiccating material by power derived from a small fan driven at high speed by a steam, gas, or other engine, or in any other convenient

manner. Or the air may be drawn through the material by a pump. The desiccating of the air may take place in an apparatus similar to a gas purifier—a rectangular vessel provided with a cover, and having removable perforated trays, on which is laid the hygroscopic material. The air enters the vessel near the bottom; and after passing through the desiccating material, escapes at the top. Or the trays to carry the desiccating material may be so arranged that the air shall pass in a circuitous path over the material. In this case, it is preferable that the air shall enter at the top, and pass out at the bottom of the vessel.

Of the many hygroscopic materials which may be employed, the patentee prefers to use quicklime broken up into small pieces, and placed on the trays. Experiments have demonstrated that a cubic foot of this material will suffice to remove the aqueous vapour from about 50,000 cubic feet of air; and as coal gas requires, to induce proper combustion, from six to ten times its volume of air, according to the style of burner used, it follows that a cubic foot of lime will dry air sufficient for the combustion of from 5000 to 8000 cubic feet of gas. The same quantity of lime will also serve to dry 50,000 cubic feet of gas or other combustible vapour.

It will be obvious that the apparatus used for burning the illuminant must be so arranged that the external undried air cannot come into contact with the flame. Thus, supposing the apparatus to consist of an Argand burner, the bottom of the chimney will be hermetically sealed against the entrance of external air, and will be in connection with a pipe for the supply of the artificially dried air. This pipe is provided with a cock, so that the delivery of the air may be controlled according to the barometrical and thermometrical conditions of the atmosphere for the time being. The object of having this control for the desiccated air supply to the flame is that a sufficient quantity of air may be always supplied to ensure perfect combustion, and to prevent access to the flame of more air than is absolutely necessary (according to the barometric and thermometric conditions) for the purpose.

Meters for Water and other Liquids.—Thomson, J., of New York. No. 6932; May 9, 1888. [8d.]

This invention relates to meters employed for measuring the flow of fluids and particularly to oscillating disc meters such as that described in patent No. 17,579 of 1887.

In most previous arrangements the disc and disc-chamber were in a more or less horizontal plane; the inlet and outlet pipes opening to the ports of, and through the disc-chamber. According to the present invention, the parts are so disposed that the disc and disc-chamber lie in a vertical plane with the diaphragm which divides the chambers at the bottom; the inlet and the outlet ports being at the bottom of the disc-chamber. The consequence of this is that any foreign material which may be carried into the disc-chamber will gravitate back into, and through either of the ports, so that the disc-chamber becomes self-cleansing to a great extent. Instead of bringing the inlet and outlet pipes directly to the disc-chamber, they are connected directly to the centres of the caps which enclose the disc-chamber; and on the inlet side a strainer is placed which practically encompasses one side of the disc-chamber. The large area in the perforations thus presented prevents material obstruction to the flow, and permits the cap to be utilized as a dirt box.

Lanterns for Gas-Jets.—Pilkington, W. L., of St. Helens. No. 9174; June 23, 1888. [8d.]

The object of this patent is to provide a lantern which will allow free radiation of light in any desired direction. It is constructed in three main parts: First, the sides and bottom, cast in one piece with an aperture or apertures for admitting air and allowing for lighting and extinguishing, and a ring or flange near the top which rests on the second part. Second, the carrier, which consists of an annulus of metal or suitable material, on which the flange or ring rests; the annulus being supported by any usual bracket or post. Third, the cover which is made of blown or cast glass with an aperture for ventilation. When the light is to be allowed to radiate upwards, the glass is transparent; but when downwards, the glass is of opal or other colour. An important feature of the invention is that the cover and main parts being of glass only, corrosion is reduced to a minimum.

Automatically Registering Flows of Water and their Application to Rotary or other Meters.—Sporton, H. H., of Enfield, and White, E., of Gunnersbury. No. 1001; Jan. 19, 1889. [8d.]

This invention has for its object improvements in registering apparatus and the application thereof to rotary and other water-meters, so that a flow of water passing through any rotary or other water-meter can be automatically registered on a diagram paper by the attachment of this appliance.

To the body of an ordinary rotary meter is attached an iron frame, with suitable adjusting screws; the frame rising vertically above the meter (on the outside of the body) to a suitable height, and then running horizontally directly over the centre of the index of the meter. This iron frame has also a table or projection on it, upon which an ordinary clock is fixed; and the clock is provided with a barrel on which is wound a wire or silken cord, carried from the barrel on the clock over two pullies connected to the horizontal or top portion of the iron frame before described. The wire or cord is made to hang directly over the centre of the index of the meter. The wire or cord supports a cylindrical drum, on which is attached a diagram paper in the usual manner. The drum is lowered by the clock as it unwinds the wire or cord off the barrel attached to the clock, and thus causes it to lower. This lowering of the diagram drum is regulated by the clock; and in the ordinary arrangement it is made to lower ½ inch per hour, so that the drum will lower 6 inches in 24 hours. The barrel on which the wire or cord is wound is, however, so arranged that it can be thrown out of gear from the clock; and the wire or cord on the barrel can be unwound or wound up so that the diagram drum can be adjusted to any particular height or hour of time. To that portion of the iron frame which is directly above the centre of the index of the meter is attached a small hollow tube, solid at the lower end with a centre-point which can be made adjustable. This centre-point fits into a step or guide formed in the top of the spindle, which projects from the interior of the meter. The wire or cord which supports the diagram drum passes down the inside of this tube, and is connected with the drum by a pin passing through the tube; there being a slot in the tube which allows the pin and also the diagram drum to be moved up and down in a vertical direction by means of the clock and wire or cord. The slot in the tube also prevents the drum from turning round. One of the spindles, which carries the index pointers in the ordinary meters, is carried up above the top of the meter; and to it is attached an L-shaped pencil-carrier, with spring to keep the pencil in contact with the diagram paper. This paper is divided into equal divisions vertically; and according to which spindle of the index the pencil-holder is attached, the divisions of the diagram represent (if the diagram is divided into ten equal parts) 10, 100, 1000, or 10,000 gallons. The diagram is also divided with horizontal lines which represent the time; and, if divided into 24 equal divisions, each division will represent one hour.

Gas-Stoves for Cooking, Etc.—Werdenberg, E., of Bâle, Switzerland. No. 4197; March 9, 1889. [8d.]

This invention, relating to gas cooking-stoves, consists in providing such stoves with small receivers for heating purposes (of small size relatively to the extent of their heating surface) communicating, by means of suitable tubes, with a water tank or cistern placed above the stove. The form of these small receivers exactly corresponds with the form of the burners of the stove; so that they are heated direct from the burners as well as by the heat deflected by the saucepans or other utensils placed on them. Thus, when the burners are lighted, a continuous circulation of the water from the cistern through the receivers takes place.

Purifier Trays.—Turnbull, G. H., of New Westminster, Canada. No. 5134; March 25, 1889. [6d.]

This invention consists in constructing the tray or grid of a purifier or scrubber of a number of slats of oval contour in cross section; and in so securing the slats together that, in the case of lime trays, the whole or nearly the whole of the surface presented to the gas will be a lime surface.

APPLICATIONS FOR LETTERS PATENT.

8179.—Runge, A., "A new or improved charging trough for gas-retorts, and apparatus for raising and operating the same." May 16.

8192.—Langer, J. von, and Cooper, L., "Process for generating gases known as water gas and producer gas." May 16.

8254.—Bayley, G. W., "Improvements in extensible gaslight and similar fixtures." May 17.

8263.—Darwin, S. B., "Improvements in compounds to be used for manufacturing illuminating gas, the prevention of stoppages in ascension-pipes, and the deposition of naphthalene." May 17.

8281.—Bedford, J. E., "The purification of water gas." May 18.

8298.—Wells, C., "A method of using gas to heat air and give motive power by the displacement of water." May 18.

8317.—Simpson, W. M., "Improvements in gas cooking apparatus." May 18.

8327.—Walker, D. M'G., "Improvements in gas-cookers." May 20.

8336.—Emery, A. F., "The improvement of gas cooking and other stoves, for regulating the outlet of heat from the flue pipes." May 20.

8389.—Penn, T. and A. E., "New or improved method of controlling the distribution of petroleum oils or any hydrocarbon for lighting purposes, and in the means or apparatus for operating the lighting and extinguishing of the burners, jets, and the like used in conjunction therewith. May 21.

8443.—Lake, H. H., "Improvements in gas-governors." A communication from T. Backeljau. May 21.

8463.—Robilliard, D. S., and Davies, C. G., "Improvements in gas-burners for heating and cooking purposes." May 21.

8519.—Cooper, V. B. D., "Improvements in the manufacture of gas for heating and other purposes." May 22.

8530.—Kesterton, H., "Improvements in gas-engines." May 22.

8675.—Delmas-Azema, H., "Improvements in horizontal-flame lamps, designed for the combustion of gas or oil by aid of heated air." May 24.

8694.—Fischer, J. F., "Improvements in the method of and apparatus for laying pipes and forming foundations in marshy or swampy ground." May 24.

Gas Exhibition and Lectures in Bristol.—A most successful exhibition of gas-stoves and other gas appliances was held in the Colston Hall, Bristol, from the 22nd to the 31st ult. Messrs. T. Fletcher and Co., of Warrington and London, were the exhibitors; and Miss Kelman, the lecturer. Very large audiences attended the lectures; and the utmost interest was taken in the practical cookery demonstrations given.

The Differential Gas-Rate at Salford.—Another meeting of the representatives of local authorities and private consumers situated within the area of the Salford Corporation gas supply, was held at the Victoria Hotel, Manchester, on the 21st ult. The Secretary (Mr. G. Trenbath) read a letter he had addressed to the Town Clerk of Salford (Mr. S. Brown), dated the 15th ult., requesting the Gas Committee of the borough to receive a deputation from local authorities on the subject of the abolition of the differential rate charged to consumers outside the borough, and the Town Clerk's reply, as follows:—"I am instructed by the General Gas Committee to inform you that your letter of the 15th inst. was read at a meeting of the Committee held on Wednesday, and to say that the Committee regret the tone of the resolution of the representatives of the out-districts in reply to my letter of the 4th inst. [*ante*, p. 964]; and I am directed further to say that the Committee have nothing to add to the information communicated to you in that letter, and therefore see no utility in again receiving a deputation on the subject." As the result of a long discussion, the representatives of the Barton Local Board and the Swinton and Pendlebury Local Board agreed—seeing that they are within what is known as the "first circle" of the gas supply, which makes their claims on the Corporation for the abolition of the differential rate much stronger than districts beyond theirs—to take joint action in future, irrespective of the other districts. They subsequently passed a resolution to take Counsel's opinion upon the right of the Salford Corporation to appropriate £41,354 of the accumulated gas depreciation fund in aid of the rates of the three townships of the borough. Subsequently a deputation had an interview with Mr. H. Lord, J.P., Chairman of the Gas Committee.

Correspondence.

[*We are not responsible for the opinions expressed by Correspondents.*]

THE REPRESENTATION OF DISTRICT ASSOCIATIONS ON THE COUNCIL OF THE GAS INSTITUTE.

SIR,—Will you allow me a small space in your columns to suggest, for the consideration of the Council of The Gas Institute, whether it would be desirable to provide, in the new rules, for the election of either the President or the Secretary of each District Association as an *ex officio* member of the Council during his year of office. I wish the question to be considered on its merits, and therefore refrain from saying one word which may influence the opinion of others.

Exeter, May 27, 1889. W. A. PADFIELD.

PHOTOMETRY.

SIR,—While thanking Mr. Grafton for his letter [*ante*, p. 1000] commenting on my article on the above subject, I think he scarcely realizes the full importance of an alteration in the present rigid adherence to a 5-foot consumption. I gave two extreme examples on gases which, tested in the usual way, came out 16·7 and 14 candles respectively; showing that the maximum difference of light by an alteration in the rate of consumption took place with the poorer gas. Mr. Grafton takes these two cases, but forgets that gas of intermediate qualities would be effected *pro ratâ*. Thus a gas which gave 15·6 candles at 5 cubic feet, gave me 16 as the value of 5 feet when the light was taken at a 6-foot consumption. While I regard an alteration of the present method only just in testing gas supposed to be of 16-candle value, but which may occasionally fall a little below when tested in the usual way, such alteration would not be so necessary in testing gas only intended to conform to a 14-candle standard, for in that case the air supply would be lessened by the use of a 2¾-inch in place of a 3-inch chimney.

Mr. Grafton is correct in stating that a 4-inch flame is too near smoking-point to be advisable; at least I find so with good quality gas. It might be used with poorer gas; but is evidently not universally adapted to varying qualities. A 3½-inch flame would no doubt be better.

The quotation from my article made by Mr. Grafton, "there need be no extreme accuracy," scarcely does me justice. The remark in the context of my article applied to the adjustment of the *height* of flame only; knowing the difficulty of *exactly* measuring the height of the flame of an Argand. The adjustment to a given height need not be accurate, as the lighting value is not obtained from this detail, but from a careful estimate of the light afforded by the flame corrected by accurate measurement of the quantity of gas used, and subsequent calculation to a 5-foot value, coupled with the usual temperature and pressure corrections.

Stepney, E., May 31, 1889. H. LEICESTER GREVILLE.

GAS STOKERS AND THE EIGHT-HOURS MOVEMENT.

SIR,—With reference to your remarks on the above subject, I may say that eight-hour shifts have, I understand, been worked in Birkenhead ever since the works were established; and to my personal knowledge during the past nine years. For this class of labour eight hours' smart work is much better than twelve hours slow, as the men are fresh when they come on and are kept well up to their work while it lasts. The twelve-hour system seems to consist of all work and sleep; whereas the eight-hour arrangement is a combination of work, sleep, and recreation.

Birkenhead, May 31, 1889. T. O. PATERSON.

WATER GAS.

SIR,—I have read with much interest your reprint of Mr. J. Ferguson Bell's paper on "Water Gas" [*ante*, pp. 948 and 993], and would ask you to allow me space to refer very briefly to one series of figures given by Mr. Bell. I allude to the calorific value in B.T.U. of coal gas, water gas, producer water gas (by which name he distinguishes the waste product made by the water-gas converter), and ordinary producer gas. At the end of his paper, Mr. Bell suggests that there would be an advantage in mixing the first three of these gases together for use as heating gas; and he gives a calculation showing that they would produce 208 B.T.U. per cubic foot. Earlier in the paper he gives an analysis of producer gas, and credits such gas with 152 B.T.U. per cubic foot. In considering this subject, it should not be forgotten, however, that the number of cubic feet produced per ton of coal of these mixed gases and of producer gas respectively is a very important item in calculating their relative efficiency. Of these mixed gases, Mr. Bell informs us that 64,000 cubic feet would be produced per ton of coal; whilst, as is well known, from 160,000 to 170,000 cubic feet of producer gas are obtained per ton. Multiplying 64,000 by 208, we get 13,312,000 B.T.U. as the calorific equivalent of the mixed gases; and multiplying 160,000 by 132, we obtain 21,120,000 B.T.U. as the calorific equivalent of the producer gas from a ton of coal. Hence it is evident, from Mr. Bell's figures, that, as a heat-producing agent, the gas-producer is 58 per cent. better than the gas-retort and the water-gas converter combined.

10, *Queen Anne's Gate, S.W., May* 29, 1889. FREDERICK SIEMENS.

SIR—Although your correspondent "Steel Maker" is sufficiently modest to hide his identity under a convenient *non de plume*, his communication is not characterized by the modesty that an anonymous correspondent should always observe. He states that one ton of steel is melted in the latest form of furnace with an expenditure of 7½ cwt. of inferior coal. The best practice in this country has never, to my knowledge, with good coal (nuts) been less than 8 cwt.; and this coal could not be delivered at anything like 8s. per ton.

To relieve his observation from the suspicion of exaggeration, perhaps "Steel Maker" will supplement his figures by giving the calorific value of the fuel, or an analysis of it, and also give specific information with regard to the furnace. The statement that producer gas, which is evolved during the blowing-up period of making water gas, should be treated as a waste product, is absurdly ridiculous. His further remark—viz., that *if* water gas produces the temperature stated, no material now in commerce would stand many days, and consequently the cost of maintenance would be enormous, proves that he has not had experience in the use of water gas. The wear and tear of an open-hearth steel furnace is, as I have before explained, not so much due to high fusion temperatures as to the following causes:—(1) The ports and roof: To frictional contact, abrasion, and attrition of the atoms of carbon evolved on the oxidation of the hydrogen. (2) Ports and recuperator bricks: The frictional contact of the products of conversion, such as atoms of slag, and the fluxing action produced by the latter. (3) General structure and furnace: The disturbance of the molecular structure of the refractory material (bricks) due to successive periods of expansion and contraction.

With water gas, the volume of gases entering into the furnace through the ports will, in proportion to the heat required, be very considerably less than when producer gas is used, and the degree of frictional contact of the gaseous molecules against the side of the ports will be reduced proportionally.

Liverpool, May 20, 1889. B. H. THWAITE.

WATER BY MEASURE.

SIR,—In this week's JOURNAL, "Meter Inspector" reports some particulars regarding an experiment made, in a place he does not mention by name, with 41 water meters. These were "inferential and of the best description"—*i.e.*, the meters used were, in the opinion of your correspondent, the best of their class which was "inferential." Other authorities might differ from him as to the propriety of using "inferential" meters at all, and they might also differ from him as to the relative merits of the special form of inferential meter he pronounces to be "the best;" but, it is unnecessary to dwell on this, because your correspondent's own statement not only shows that the first conditions of success were absent, but he admits that "water may be sold by meter in a superior manner to that here described." I should think so!

When he proceeds to indicate the nature of this superior manner of selling water by meter, he himself assumes a "superior manner," and uses such expressions as "must" and "must not" rather frequently. For example, he amongst other things, says, "the consumer must not be allowed to own the meter." In answer to this, I ask, Why not? Gas consumers are not forbidden to own their gas meters; and gas companies are compelled by law to permit this, provided the meters are stamped and so certified as complying with certain legal conditions. Now why should water-meters not be stamped, and so certified, and consumers be allowed to own them if they see fit?

"Meter Inspector" says "the meter must be fixed in an accessible place, so that it may be changed quickly." People's ideas will differ as to what is an "accessible place;" and it is certain that the places selected for the meters which were the subject of the so-called "experiment" were anything but "accessible."

Your correspondent proceeds to say that, "water-meters *must* be read once a month at least, and changed every two years." This "must" derives any force it may have from experience similar to that of your correspondent, and applies only to the meters in connection with which such experience has been obtained. It may be desirable to "read" *water*-meters once a month, just as it is sometimes the practice to "read" *gas*-meters at short intervals; but, it ought clearly to be understood that, whenever this is held to be necessary *for any reason connected with the meter*, it points to a defect in the particular meter used, and shows that a more reliable instrument should be employed.

Like other opponents of the "low-pressure" system, your correspondent falls into the common mistake of attributing to low-pressure meters the production of conditions with which they have nothing whatever to do. For example: Is it because of a *low*-pressure meter being used that "the cistern is usually placed in the roof; it is without a lid; and the water is covered with soot and dust?" Is it because of a *low*-pressure meter being used that "there is no one in the house capable of getting up to this inaccessible place; consequently the cistern is never cleaned out?" And, further, Is it because *low*-pressure meters are used that, "in London, when travelling by rail, we see the cistern over the water-closet, with the water as green as grass; and we fancy what must be the 'drip drip' into this abominable receptacle?"

The obvious answer to all this is to ask whether your correspondent proposes to abolish cisterns; for, if he does not, his remarks have no meaning whatever, *so far as meters are concerned*. The evils arising from the contamination of water in cisterns may be, and ought to be, lessened, and, as far as possible, removed; but as meters do not cause these evils, it is absurd—to use no harsher word—to speak, and to write, as if *low*-pressure meters would either produce or increase evils of this kind, whilst *high*-pressure meters would either prevent or reduce them.

No doubt the object of "Meter Inspector" is partly to decry the use of meters altogether; but I rather think his *chief object is to raise objections to low-pressure meters, as such, more especially*. He ought, however, to be more careful in the use of his arguments, and not to employ such as *tell only against cisterns*, unless he has the clear intention of "going in" for the abolition of cisterns altogether.

May 30, 1889. LOW PRESSURE.

LOW-PRESSURE WATER-METERS.—A correspondent, writing on the subject of the discussion on low-pressure water-meters which has taken place in the JOURNAL from time to time, points out that the makers of these meters do not supply a list of the companies who use them; and he says he does not see anything in the technical papers about the advantages to be derived by their adoption. He has written to a few managers who are said to employ them, but cannot get any satisfactory reply. With regard to cost, he says, there is a wide difference in the price of two meters capable of passing about 100 gallons of water per hour, supplied by different makers. He thinks it would be interesting if some of our readers would state their experience with the low-pressure system of supply.

THE Southampton Town Council, at a recent meeting, resolved that the two reservoirs on the Common should be covered over at an estimated cost of £5000; and the Town Clerk was instructed to apply to the Local Government Board for sanction to borrow the amount for a period not exceeding 50 years.

Parliamentary Intelligence.

HOUSE OF LORDS.

FRIDAY, MAY 31.

The Examiners having reported that the Standing Order applicable to the Gas and Water Orders Confirmation Bill had been complied with, the Bill was read a second time.

The following progress was made with Private Bills during the past week:—

Standing Orders complied with: Belgrano (Buenos Ayres) Gas Company Bill, South Kent Water Bill.
Bill read the first time: Liverpool Corporation Bill.
Bill read a second time: South Kent Water Bill.
Bills reported: Barry and Cadoxton Gas and Water Bill, Morley Gas Bill, Stapleford and Sandiacre Water Bill (formerly Long Eaton and District Water Bill).
Bills Royal Assented: Bristol Water Bill, Deanhead Commissioners' Bill, Edinburgh and District Water Bill, Faversham Gas Bill, Hythe Corporation Bill, Kettering Water Bill, London Hydraulic Power Company Bill, Yeadon Water Bill.

HOUSE OF COMMONS.

MONDAY, MAY 27.

METROPOLIS WATER BILL.

The Examiners reported that the Standing Orders applicable to the above Bill had not been complied with; and the report was referred to the Select Committee on Standing Orders. Subsequently, however, on the order for second reading, the Bill was withdrawn.

COAL DUTIES (LONDON) ABOLITION BILL.

On the order for resuming the adjourned debate on the motion to refer this Bill to a Select Committee (see *ante*, p. 1004), the question was put and agreed to, and the Bill referred.

THURSDAY, MAY 30.

STATISTICS OF METROPOLITAN WATER COMPANIES.

A return was presented giving the statistics relating to the Metropolitan Water Companies for the years 1883 and 1887 moved for by Mr. Firth on July 2 last year.

The following progress was made with Private Bills during the past week:—

Standing Orders complied with: Rastrick Water Bill.
Bills read a second time, and committed: Cleveland Water Bill, Manchester Corporation Bill.
Bills reported: Burnley Corporation Bill, Coventry Corporation Water Bill, East Kent District Water Bill, Garw Water Bill, Newcastle and Gateshead Water Bill, Plymouth Dock (Devonport) Water Bill, Tuscan Gas Bill, Windermere District Gas and Water Bill.
Bills read the third time, and passed: Deanhead Commissioners' Bill, Liverpool Corporation Bill.

HOUSE OF LORDS COMMITTEE.

THURSDAY, MAY 16.

(*Before Lord* BELPER, *Chairman; Earl of* BUCKINGHAMSHIRE, *Earl* HAREWOOD, *Lord* LAWRENCE, *and Viscount* DE VESCI.)

BELFAST WATER BILL.

This Bill by which the Belfast Water Commissioners seek for authority to construct works for filtering the supply of water to the city of Belfast and the suburban districts, and to confer further powers on the Commissioners, came before their Lordships to-day.

Mr. POPE, Q.C., Mr. MACASSEY, Mr. FITZGERALD, and Mr. M'HUGH appeared for the promoters; Mr. PEMBER, Q.C., and Mr. HILL, for Lord Downshire's Trustees, who opposed the measure; and Mr. WOOD and Mr. O'ROURKE, for certain property owners and occupiers at Carrickfergus.

Mr. POPE, in opening the case for the promoters, said that the Bill would be a very small matter, except for the necessity which arose that he should discuss the financial part of it. The works proposed were the construction of filter-beds, another reservoir, a conduit, and the means for carrying past the reservoir the foul water which had become more or less unfit for domestic use by reason of land coming into cultivation. The last two were the works which would give their Lordships cause for some attention. The Marquis of Downshire's Trustees objected to the first conduit, on the ground that it would intercept water from their property. In that they were mistaken. The second petition was in regard to the intercepting conduit. They had a number of inhabitants who objected to the Commissioners carrying the foul water past the reservoir, on the ground that it would be discharged into the river, and thereby affect the water supply of parties lower down, who asserted that this discharge would not improve the character of the river itself. It should be remembered that the water to be carried past the reservoir was only the foul water that had become foul by reason of the growth of the neighbourhood, and which, if the water-works were not there at all, would have to go into the river. The object of the Commissioners was to intercept this foul water, so as to prevent that used for domestic purposes being contaminated. As to the question of finance, they proposed to raise a certain sum of money for the construction of these works. The principal ground upon which they desired equitable adjustment of their finances was this—not being a municipal authority, the Water Commissioners had no rating power, except that given them, with reference to the water; and if, therefore, they were bound to increase their rate in order to pay interest (say, on any money required for works), that could only be done by increasing the price of water. Belfast was a rising community—it was a community to which, in the judgment of the Commissioners the use of water was of the utmost importance, and which use should be encouraged in every possible way. The price, therefore, of the water—the taxation necessary in order to maintain the supply—became a matter of very vital consequence in Belfast. In the case of an ordinary municipal authority, in the event of the water undertaking not paying its expenses, or paying the interest on its debt, they had the power to fall back on the borough rate—a totally independent rate, and apart altogether from the price of water. The Belfast Water Commissioners had no such power. They were anxious to maintain their present water-rate, rather than increase it. In regard to the repayment of the debt incurred for the proposed works, they intended to consolidate the new stock and the whole of the debt whenever contracted; and they asked to be allowed by the sinking fund to repay this consolidated stock at the end of sixty years. In the schedule to the Bill, their Lordships would see what the debt was that it was suggested to consolidate, and when it was raised. There was £33,982 outstanding for the debt contracted in 1840; £119,724 for the debt contracted in 1865; £68,000 for the debt of 1874; £178,000 for the debt of 1879; and £152,000 for the debt of 1884. The total amount authorized was £626,000; and of this £71,000 had been repaid, in conformity to the obligation—leaving still £554,000. Instead of taking the average of the whole of the debt, and saying they would repay it from that period, which would represent about forty-five years, they proposed to extend the period in some instances, and not interfere with others to any extent. That would be to the advantage of the Commissioners to add fifteen years more to the average for the repayment of the debt, as it would enable them to obtain from the generation to come that contribution to the cost of the works which would keep the cost of supply in Belfast exactly as it was. Not only had the money been repaid, but there was yearly an excess of £17,000 that had been paid into the sinking fund in reduction of the existing debt.

Mr. *J. Colligan*, examined by Mr. FITZGERALD, said he had lived for upwards of forty years in Belfast, during which time there had been a continual increase in the population. In 1884 the Commissioners went in for a supply of water from the Stonyford district. These works would be completed in the course of two years; and they would then have an increased supply of 4½ million gallons per day, or 11 million gallons in all. The present reservoir was not capable of storing all the water of the district; hence the necessity for the supplemental one asked for in the Bill. The supply was now 30 gallons per head per day; but when the new works were completed, this would be enlarged; and the supply would, it was estimated, be sufficient for fifty years to come, calculating an additional increase of the population of not less than 160,000. The present supply was analyzed by three analysts; and they agreed that the water should be filtered, in order to improve its quality. It was in consequence of these reports that the Commissioners decided to ask for powers to construct filter-beds. The Commissioners desired to consolidate their debt by the issue of general stock; and take sixty years to repay the same—the sixty years not beginning to run till ten years hence. By that time they would be getting a return from the works sanctioned by the Act of 1884. Their debt consisted of mortgages; and the rate of interest was about 4 per cent. As the mortgages became due, they intended to issue stock at 3½ per cent.

Cross-examined: So far as the proposed conduit passed through Lord Downshire's estate, the Commissioners were willing to enclose it.

By the CHAIRMAN: The works constructed since 1840 were all in an excellent state of repair, and calculated to last many years to come with ordinary care.

Mr. *F. W. M'Cullagh*, C.E., examined by Mr. MACASSEY, said he was in charge of the Stonyford works, which would be completed in about ten months' time. The works previously authorized had been carried out in a most substantial manner, and required only ordinary attention. Having given details of the engineering work, he stated that a number of the parties who were petitioners against the Bill were themselves fouling the stream very badly; and they had no justification for the attitude they had assumed towards the measure.

Dr. *C. Meymot Tidy* said, after an examination of the catchment area and of the whole of the Belfast water supply made last year, he was in a position to say that the supply was a very good one. He recommended that the water should be filtered, not because this would make it more wholesome, but in order that the organic matter might be reduced, and the water made more bright and less coloured.

Cross-examined: In the Belfast water, there was a larger proportion of organic matter than usual.

FRIDAY, MAY 17.

Mr. WOOD this morning addressed their Lordships at some length on behalf of the owners and lessees and occupiers on the banks of the Copeland water. It was, he said, conceded in the Bill that the water which was to be diverted and turned into this stream was polluted. If it was not, then *cadit quæstio* there was no matter to go before the Committee. But not only was it polluted, but polluted to a very serious extent. If it was not, it was very improbable that the Commissioners would have come to Parliament for this power, and would go to the expense of making the proposed conduit. On the face of it there was serious pollution; and the promoters cared not what became of it so long as they got rid of it from their own property. But this pollution, passed on by the Commissioners to the Copeland water, would be a very serious injury to those whom he represented. The main answer made to their objections was that there were already pollutions flowing into this water; and as there was some coming from those who opposed the Bill, therefore no objection should be taken to the pollution proposed by the Water Commissioners. He denied that there were any serious pollutions from the residences of his clients. What did come from the meadows was spread over a wide area, and was totally different to pollution brought *en masse* through a conduit-pipe, and sent into the stream at one place.

Mr. *J. Whiteford*, Surveyor for the Downshire Trustees, examined by Mr. HILL, said he had gone over the land through which it was proposed to carry the works mentioned in the Bill. The area which conduit No. 26 covered in passing through the Downshire estate would amount to 700 acres. All the farmers in the district would be more or less affected by the sanitary clauses. The people of Belfast had already a very large and good supply; and the proposals in the Bill needlessly interfered with private rights.

Mr. FITZGERALD: We do not propose to take any water from the estate, and the objection on this point has been withdrawn.

The CHAIRMAN said the Committee were of opinion that the preamble, so far as the sanitary clauses were concerned, might pass, subject to certain modifications; but in their judgment the foul water should not be sent down into the fresh water going down from the Copeland reservoir. They thought it desirable that some arrangement should be arrived at by which the foul water might be carried away from the reservoir by means of a pipe in some other direction; and they would be glad to hear if an agreement could be come to between the parties to give effect to this expression of opinion. If no agreement could be arrived at, the Committee would have to consider whether they would pass the clause as it stood.

It was agreed to consider in the meantime the financial part of the Bill.

Mr. *R. J. M'Connell* was the first witness examined in regard to the financial clauses of the Bill. As Chairman of the Financial Committee of the Commission, he had paid considerable attention to this phase of the question. The net liabilities of the Commissioners amounted to £554,000. The rate of interest on the moneys borrowed was 4 per cent.—£3 18s. per cent. was, he believed, the exact figure. The Commissioners were bound by their Act to put aside 1 per cent. annually as a sinking fund; and, in addition to this, they had overpaid into the fund the sum of £17,000. This latter sum was derived by the sale of works which had become unproductive and useless for the purposes of water supply. The obligation of 1 per cent. put on the Commissioners in 1865 worked out to forty-seven years from the time of borrowing; but this obligation was not to take effect till 1872, or seven years after the passing of the Act. An extended period for the repayment of the loan was asked for. It was proposed under the Bill to borrow £170,000. It was intended to repay all the

loans previous to 1884 within sixty years; and for loans contracted since then, and that mentioned in the Bill, the period asked was sixty years, *plus* ten years. A considerable proportion of the money to be borrowed would be devoted to the extension of works with a view to the future requirements. The cost of the Stonyford scheme would amount to £100,000. Compared with towns of equal size in Scotland and elsewhere, their domestic and trade prices for the water were high; and what they desired in the interests of the trade of the city was to keep pace with other towns, and be placed in an equal position with them. The interest on the 1884 works would amount to £4000 a year; and the revenue from them for some years would be practically *nil*. In this sense the present was paying for the benefit of the future generation. The yearly outlay on the filtering works for interest and management would be £5000.

The CHAIRMAN: How much would be interest, and how much for management.

Witness: £4000 and £1000 respectively.

Does that include the renewal of filters over the two years?—Yes.

Examination continued: These works would enhance the value of the water supply, although they would not bring in any additional income. The unremunerative character of this outlay was in itself a good ground for asking for an extended period for the repayment of the loans. If the proposals did not receive parliamentary sanction, the Commissioners could not carry out the works without raising the rates. The Commissioners' rating powers extended to 1s. 8d. in the pound.

Sir *W. Ewart*, M.P., said he was fairly acquainted with the condition of Belfast, and could state that in the interest of the city it was of the greatest importance that cheap water should be supplied. This was especially the case in considering the industrial occupations. Small manufacturers, encouraged by the cheapness of the water, were coming to the front daily; and any additional rise in the rates would injure them in many cases. Taking all the circumstances of Belfast into account, he considered the proposals in the Bill as to the extension of time for repayment of the debt fair and just. The number of working-class houses was very large; and in this respect Belfast differed from most manufacturing towns. The cost of providing the water supply to these houses was very considerable; while the income derived therefrom was small.

Mr. *A. Duffin*, a member of the Belfast Chamber of Commerce, stated that the Chamber passed a resolution in favour of the Bill. He endorsed the evidence given by Mr. M'Connell; and, from the financial and industrial points of view, strongly supported the Bill.

Mr. FITZGERALD then addressed the Committee on the Commissioners' financial proposals. They were not asking anything that was unfair or opposed to the practice of Parliament in desiring to have the period for the repayment of the loans extended to sixty years. He showed that in the cases of Birmingham ninety-five years had been granted; Brighton, seventy; Liverpool, seventy; and Manchester, eighty. The equated period of the Commissioners' debt would work out to forty-five or forty-six years. If the overpayment made by the Commissioners into the sinking fund were taken into account, the equated periods would work out to forty-eight years. Practically, therefore, all the Commissioners were asking to do was to extend the period by twelve years.

After the Committee had deliberated in private,

The CHAIRMAN said they had decided to grant a period of sixty years for the repayment of the amount to be raised under the Bill. With respect to the already existing debt, which it was desired to consolidate, they were of opinion that it should be consolidated on the usual terms of the equated periods.

Mr. FITZGERALD: Have the Committee in their decision considered the overpayment of £17,000 into the sinking fund?

The CHAIRMAN: In consideration of that, we grant an additional four years; and the sinking fund for the new debt would be from the time of borrowing.

Mr. WOOD, in reply to the Chairman, said he had suggested a clause on the question left open for adjustment between the parties; but it had not been accepted. This clause proposed the laying down of a pipe for carrying the foul water into a filter-bed above the reservoir; and in the event of the Commissioners polluting the Copeland stream, proposed to levy a penalty on them of £50 each day the offence was committed.

Mr. FITZGERALD said it was impossible to agree to the terms of the clause submitted.

After some discussion, the matter was postponed till Monday.

MONDAY, MAY 20.

On the proceedings being resumed this morning,

Mr. FITZGERALD announced that a clause bearing on the disputed question of the foul water conduit had been forwarded to Counsel representing the owners and occupiers of land on the Copeland water, which had so far met their views that he understood it had been accepted; and this point might now be considered disposed of.

Mr. CRIPPS (of Messrs. Dyson and Co.), on behalf of the petitioners against the Bill, said that in respect to the proposed new clause to which Mr. Fitzgerald referred, it would, he believed, be considered a satisfactory compromise.

Mr. *R. Hamilton*, the Secretary to the Commissioners, was called; and in reply to the CHAIRMAN, said that with regard to the statutory obligation to provide and maintain a sinking fund under the Act of 1840, no provision was made for setting apart any sinking fund. In the Act of 1865, a provision was inserted in regard to the amounts to be borrowed under that Act, and the amounts borrowed under the Act of 1840. This clause, however, did not come into operation until 1872. The term was fifty years from that date. This, however, was altered by the Act of 1874, which provided a term of forty-nine years from that date.

The Committee consented to allow a term of forty-nine years on the old moneys, and sixty years on the new loans under the present Bill; the period to date from the time of borrowing.

An application to allow the petitioners their costs was refused; and the Committee then proceeded to consider the clauses. The most important alteration made was in a paragraph of the clause referring to conduit No. 25. This will not now run down past the Copeland reservoir, and discharge the foul water into the river immediately below. By the compromise arrived at, the conduit will be truncated; and the sewage or foul water will be diverted from the reservoir into a tank, and utilized for irrigating the land in the immediate vicinity. A number of modifications were introduced into other clauses; and the Bill as amended was ordered to be reported.

AT the Auction Mart yesterday week, £2300 of ordinary "B" stock of the South Metropolitan Gas Company (the property of a deceased proprietor) was offered for sale by Mr. G. Ayscough Wilkinson. There were only a very few bidders; and as their offers did not reach a sufficiently high figure to satisfy the auctioneer, the stock (which has had 12½ per cent. dividend paid upon it) was withdrawn.

Legal Intelligence.

HIGH COURT OF JUSTICE—QUEEN'S BENCH DIVISION.

TUESDAY, MAY 28.

(*Before Justices* FIELD *and* CAVE.)

WEST *v.* THE GASLIGHT AND COKE COMPANY.

A QUESTION UNDER THE EMPLOYERS' LIABILITY ACT.

This was an appeal by the defendants against a judgment for £50 recovered by the plaintiff in an action, brought under the Employers' Liability Act, tried at the Westminster County Court. The duty of the plaintiff was to cool the coke drawn from the retorts; and in doing so he had to stand under a staging on which the men above were charging the retorts. While so employed, a piece of coal fell upon him, and injured him. It was alleged that there was negligence on the part of the defendants in not providing a "fender," as was done in some of their retort-houses.

Mr. MORTEN, in support of the appeal, said the question was whether the absence of a fender was such a defect as entitled the plaintiff to recover. The plaintiff had been employed by the Company for three years, on and off; and as he had been at work in this particular retort-house during the whole of the day on which the accident occurred, he knew perfectly well that there were no fenders. He admitted that it was the duty of those engaged in quenching the coke not to work under the men who were charging the retorts, as steam would rise which might cause injury to them. The man, knowing there was no fender, was aware that the coal might fall; but with this knowledge he went to work below without raising any objection or making a complaint—thus bringing himself within *Thomas v. Quartermaine*, where the Court of Appeal decided that a person who undertook a risk could not recover in the event of an accident.

Mr. CRISPE, for the plaintiff, was not called upon.

Justice FIELD said the first question in the case—viz., as to whether there was any defect in the condition of the plant—was eminently one for the jury; and if there was any reasonable evidence to go to the jury on this point, the matter was concluded, as it was not alleged there had been misdirection by the Judge. He thought there was reasonable evidence to go to the jury on the question of defective arrangements. On the other points—viz., contributory negligence, and the plaintiff's willingness to undertake the risk—his Lordship was against the defendants; and therefore the verdict would stand.

Justice CAVE was of the same opinion.

The appeal was accordingly dismissed, with costs.

DIVINING FOR WATER AT HASTINGS.—There appears to be a hope now that the search for an adequate supply of water on the new workhouse site at Hastings, for which, it will be remembered, the Board of Guardians employed Mr. Mullins, the "diviner," will be attended with success. The architect reports that 2300 gallons of water are now running daily into the well, which has been sunk to a depth of 198 feet.

REDUCTIONS IN PRICE.—The Directors of the *Dorking Gas Company* have given notice that, from the date of the inspection of the meters for the current quarter, the price of gas will be reduced from 4s. 2d. to 3s. 9d. per 1000 cubic feet; the charge to the Dorking Local Board being 3s. 5d. ——The *Tyldesley Local Board* resolved at their last meeting to reduce the price of gas to all consumers in Tyldesley and Astley by 5d. per 1000 cubic feet from the 1st prox.

THE END OF A LIGHTING EXPERIMENT AT ASKAM.—Yesterday week, at the meeting of the Dalton Local Board, a report was submitted by the Special Lighting Committee on the experiments made at Askam in the lighting of the streets with gas manufactured on a patent principle from scrap iron and chemicals. The results were stated to be unsatisfactory; and on the recommendation of the Committee, it was decided that the contractors should be required to remove their works, plant, and apparatus.

THE ASSESSMENT OF THE CROYDON CORPORATION WATER-WORKS.—In the JOURNAL for April 23 last (p. 776), in referring to the new water-works of the Croydon Corporation at Addington, it was stated that they had been assessed at £2360 gross, or £1712 rateable value. The Water Committee instructed the Town Clerk to appeal against the assessment, and gave him power to assent to such modification as he considered reasonable. The result of the appeal has been a reduction by the Assessment Committee of £250. There will, however, shortly be an increase in the assessment of the property under the care of the Committee—amounting probably to an addition to the present assessment of about £250—in consequence of the outlay within the borough.

SALES OF SHARES.—On the 25th ult., Mr. W. V. Willson sold by auction some stock of the *Southend Gas Company*. Parcels of £50 of original 10 per cent. stock fetched £100; a £40 lot realizing £82. A £50 lot of improvement stock (5 per cent.) fetched £51. Some new ordinary £10 shares (7 per cent.) were sold in parcels of five; the prices realized ranging from £71 to £74 per lot. A lot of two sold for £28. On the same occasion two parcels of £50 of "H" stock of The Gaslight and Coke Company were knocked down for £79 each, and three similar lots at an advance of £1 on this figure.——At a recent sale at Hastings, Messrs. J. and A. Bray sold 16 £25 shares in the *Hastings and St. Leonards Gas Company* at from £58 to £59 10s. per share; and 14 £20 shares at £40 each.——At Ashford, last Tuesday, ten paid-up £5 shares in the *Wye Gas and Coke Company* were sold by auction for £40.——At Stalybridge last Wednesday, 12 original £10 shares in the *Glossop Gas Company* were sold at £21 each. On the same occasion three perpetual annuities in the *Haslingden and Rawtenstall Water Company*, amounting respectively to £6, £2 11s. 7d., and £3, (increasing eventually to £4), were sold for £360.

GAS EXHIBITION AT SLEAFORD.—Stimulated by the great success that attended the exhibition held three years ago, the Directors of the Sleaford Gas Company, acting in concert with Messrs. T. Fletcher & Co., held a similar exhibition in the Corn Exchange last week. The latest improvements in gas cooking-ranges, stoves, lamps, burners, washers, &c., were shown. The exhibition was opened on Tuesday evening by Mr. Kirk, M.A., in the presence of a large audience. In addition to the display made by Messrs. T. Fletcher and Co., the Gas Company had a variety of gas cooking and lighting appliances on view, under the control of their Manager (Mr. H. Wimhurst), who was untiring in his exertions to make the exhibition as interesting as possible to visitors. The customary gaseliers had been removed, and the hall was lighted with various kinds of high-power lamps; and the Welsbach incandescent light was also shown. One of Cutler and Cloudsley's prepayment meters was on view; as also an "Otto" gas-engine and a model gas-works. Lectures on cookery were given daily by Miss H. M. Young, of Warrington. Taken as a whole, the exhibition, which closed on Friday, may fairly be credited with having attained its object.

Miscellaneous News.

ELECTRIC LIGHTING IN THE METROPOLIS.

BOARD OF TRADE INQUIRY.

(*Before Major* MARINDIN, C.M.G., R.E., *assisted by Captain* CARDEW.)

FOURTEENTH DAY—FRIDAY, APRIL 26.

Mr. *J. H. Smith*, Vestry Clerk of St. George's, Hanover Square, examined by Mr. HITCHINS, said the Vestry appointed a Committee to consider the subject of electric lighting; Lord Hobhouse being the Chairman of the Committee. Four Companies had made application for lighting the parish—the London Electric Supply Corporation, the Metropolitan Electric Supply Company, the Westminster Electric Supply Company, and the Chelsea Electric Lighting Company. The Committee reported on these applications to the Vestry, who opposed the Orders. Setting aside the Chelsea Company, it was objected that the time for establishing the works was too long; and the Vestry proposed that it should be reduced to 18 months. They also objected to overhead wires, which they thought should not be placed without their authority. The next point was the question of a penalty; and they insisted upon a money penalty of £5 a day, if the Company failed to supply the electric light after having been duly required to do so. The Committee likewise objected to the powers of the Board of Trade to absolutely revoke an Order, as it would permit a company to abandon a district. Upon the recommendation of the Committee, the Vestry passed a resolution to the effect that they approved of the London Electric Lighting Corporation's Order, provided they accepted the suggested amendments. Similar resolutions were afterwards passed with regard to the Metropolitan and Westminster Companies, conditionally on the Companies acceding to the terms of the Vestry; but they declined to give any encouragement to the Chelsea Company. The Vestry were in favour of competition so far as it could be obtained to the benefit of the consumers. At the same time they considered that three Companies, if admitted into the whole parish, would be quite as many as should be allowed, looking to the question of interference with the streets.

Mr. MOULTON: Is it not a fact that my Company undertook to put their mains in every street?

Witness: Not every street. I picked out several lines where there were no mains provided. But they were provided in all the principal street.

Did not my Company undertake to put down mains everywhere after requisition; and the other Companies only undertook to do so on requisition after a certain period?—After a longer period, I believe.

So that the difference between the two is that we undertook to put down mains in all streets, and to give a supply to all spaces not scheduled, on requisition; while the other Companies only undertook to do so after a year and a half. So that supposing my Company to have carried on the work, all parts of the parish would have been thoroughly lighted, would they not?—It might have been a failure. I cannot say. (Laughter.)

But suppose they carried out the obligations as stated in the Order, your district would have been thoroughly lighted, is that not so?—I cannot go so far as that. I will go so far as to say that wires would have been put down in the principal streets.

And the only objection, then, is that the one Company proposed to do a portion of the parish, and the other the whole. Have you studied which is the kind of property best suited for electric lighting?—My opinion is that the larger houses would be more able to afford the luxury.

Mr. HITCHINS asked witness if Major-General Webber, on the part of the Chelsea Company, had not refused to include the whole parish.

Witness said he thought so.

Mr. HITCHINS: That finishes my case.

Mr. HEWITT, for the Kensington Vestry, said there were no fewer than six Companies who sought powers in his district—viz., the Metropolitan Electric Supply Company, the London Electric Supply Corporation, the Notting Hill Electric Lighting Company, the Kensington and Knightsbridge Electric Light Company, the House-to-House Electric Lighting Company, and the Chelsea Electricity Supply Company. The Vestry appointed an influential Committee to consider the matter. Mr. R. Hammond, who represented the House-to-House Company, stated before the Committee that he would be satisfied to work the area allotted to him, and lay mains in the principal streets as the Vestry should determine; and he agreed to a right of purchase by the Vestry within 21 years. They also agreed to light any part of the area within two months. The next gentleman who came before the Committee was Major-General Webber, who also agreed to the purchase right within 21 years, and offered to light the area within six months. Mr. Crompton, for his Company, offered to light two-thirds of the area in two years, and the remainder within three years. The representatives of the Metropolitan and London Electric Supply Companies were also heard; but these Companies had withdrawn. The Committee divided the parish into six sub-districts; and allotted the first to the London Electric Supply Corporation, the second to the Metropolitan Electric Supply Company, the third to the Notting Hill Company, the fourth to the Kensington and Knightsbridge Company, the fifth to the Chelsea Company, and the sixth to the House-to-House Company. An exhaustive report was submitted to the several Companies.

Major MARINDIN observed that he understood the position to be that the various Companies accepted the Vestry's views.

Mr. HEWITT said that was practically the case, and the various points had been submitted to the Board of Trade. The Kensington and Knightsbridge Company formulated a series of objections. The Vestry considered that some uniform system of laying the wires should be adopted, and that they should have the power to determine where the wires should be placed, and also to lay down culverts for the wires. The changes made in the Order in accordance with the recommendation of the Committee were to the effect that all the works should be performed to the satisfaction of the Surveyor to the Vestry, be made of the best and most approved fashion, and be completed in such time and manner as the Local Authority should require. It was also thought that a provision should be made, before electric lighting stations were erected, that the sanction of the Local Authority should be obtained. The Committee were likewise of opinion that the system of charging for the light required revision. They thought that there should be a provision for revising the scale of charges, and that there should be a sliding scale, the same as was provided by Parliament with regard to gas companies. It was also considered that, unless a purchase clause was inserted, the Companies would have a monopoly for 42 years. The Orders were altogether silent as to the amount of capital of each Company; and the Vestry of Kensington thought that the Board of Trade should be asked to insert a clause dealing with this matter. In conclusion, he wished to observe that it ought to be borne in mind that electric lighting companies, although engaged in a laudable object, were not benefactors, but simply speculators, and that the local authorities were the best judges of the requirements of their districts.

Mr. H. L. CRIPPS (for the Marylebone Vestry), in objecting to the Order of the London Electric Supply Corporation, said the district was rather peculiarly situated, as, under the present scheme, it would be on the very outskirts of the area of supply from Deptford. The Vestry had favourably considered the case of the Metropolitan Electric Supply Company, who proposed to have a station in the parish; and, on the assumption that this would be the only Company to supply them, a certain limit was to be placed on the price, which was to be subject to revision at the end of seven years, as was the case in the Strand agreement. After considering all points, the Vestry asked that the arrangement with the Metropolitan Electric Supply Company should be sanctioned, with certain alterations and modifications, and that for the present the London Electric Supply Corporation should be left alone.

Mr. *W. E. Greenwell*, Solicitor to the Marylebone Vestry, examined by Mr. CRIPPS, generally corroborated this gentleman's opening statement as to the proposed arrangements of the Vestry with the Metropolitan Company.

Cross-examined by Mr. PEMBER, witness said that, in an interview with the representatives of the London Electric Supply Corporation for modifying the terms of the proposed Provisional Order, the questions of a revision of price at the end of seven years, and the powers of the Vestry over opening the streets were pointed out to be very indefinite. The Corporation had since abandoned their proposal for an Order for the north side of the parish. The Vestry had heard from Lord Crawford that the Corporation refused to agree to any revision; and therefore they opposed the Order being granted.

Mr. PEMBER: Was one of the conditions of the Metropolitan Company that they should have exclusive rights?

Witness: No; the Vestry would not have agreed to any monopoly.

Mr. H. L. CRIPPS next proceeded with the case of the united parishes of St. Margaret's and St. John's, Westminster. He said Westminster was in the peculiar position of desiring the Board of Trade not to grant any Order for lighting the district. It was thought desirable by the Vestry, in view of the present incomplete knowledge on the subject of electric lighting, and also of the important information that was being given in the inquiry, that the result of that should be awaited. Consequently, the Vestry had not given their consent to any of the Orders, and had decided to ask the Board of Trade to leave them in the advantageous position of waiting for another year. The Vestry had, so far as regarded the Knightsbridge portion of the parish, given their assent to the granting of two Licences; but he asked that the Board of Trade should leave Westminster alone for the present. In this request the Vestry were influenced by the fact that no immediate or present demand for electric lighting in any part of the parish had been presented to them.

Mr. H. C. JONES, Clerk to the St. Giles's District Board of Works, Bloomsbury, said the authorities for whom he appeared were sincerely desirous that the electric light should be introduced into their parish; and in the objections which they had lodged to the Orders, nothing of a factious character had been put forward. His Board had had considerable experience in regard to electric lighting. They had some time since inspected the works of the London Electric Supply Corporation at Deptford; and, having regard to the experience gained of the electric lighting in St. Giles's, they were of opinion that it was most desirable that the works should as far as possible be kept out of large centres of trade and professional businesses. At the present time there were in his district several private installations of the electric light, which had given rise to complaints, owing to the vibration caused by the machinery. And seeing that the station of the Metropolitan Company was to be established in Sardinia Street, which was immediately at the back of valuable property in Lincoln's Inn Fields, it seemed to his Board to be open to very great objection. It was then a question whether the system of the London Electric Supply Corporation, of manufacturing their electricity away from the Metropolis, was not the one most worthy of support. But, desiring to have the light, the Board had given their consent to the Orders of both Companies, reserving their right to make their objections, of which they had several in each case, before the Board of Trade. The Board asked that no company should be empowered to obtain a revocation of a part of an Order, and leave themselves with only the most profitable portions of the district. With regard to disputes arising between the suppliers and their consumers, the Board of Trade should be the arbitrators. As in the case of the Strand District Board agreement, there should be a minimum charge fixed; and no one district of London should be treated more fairly than another. The proposed minimum charge was exceedingly high; and it was possible for the Company, if they chose, to fix it lower. If the minimum were reduced it would lead to a much larger number of persons using the electric light. Referring to the Strand agreement, witness complained that his Board had not been treated fairly.

As no witness was called for the St. Giles's District Board,

Mr. H. C. CRIPPS examined Mr. *Jones*, who said that his Board, while assenting to the principles of the Metropolitan Company's agreement, reserved its right to deal with the details of the proposals. Whilst not objecting to negotiations between companies and the local authorities, the District Board did object to the supply of one district being under any terms except those of the Act of Parliament, or to advantages being given to occupiers in the Strand district which were not afforded to those in the adjoining district of St. Giles's.

Mr. CRIPPS stated that it was not proposed by his Company to give the Strand any advantages which would not be offered to the whole of the Mid-London area.

Mr. H. J. SMITH, for the parish of St. Mary, Lambeth, stated that that was a very large one, and contained a population of upwards of 250,000. The only two Companies which affected the district were the London Electric Supply Corporation and the Metropolitan Company; and the latter were asking for powers over the whole area. His Vestry considered that any company which undertook the lighting of the district should, as did the Gas Companies, accept responsibilities as well as seek advantages. But it seemed that both the Companies named sought to have as many advantages as possible, and avoided as many responsibilities as they could. Should either Company undertake the lighting, a compulsory area to be lighted should be defined. If the Vestry had any preference, it was for the Metropolitan Company, because they would take the rough with the smooth, and light the whole of the area of Lambeth. But the Vestry would withhold their consent to the Order of either Company, unless they agreed to accept a compulsory area, which the Vestry would select, to be lighted.

Major MARINDIN asked whether, if clauses were inserted in regard to this compulsory lighting, the Vestry would assent.

Mr. SMITH said they would.

Mr. COATES, speaking on behalf of the St. Pancras Vestry, said they proposed to undertake the supply themselves; and he asked that no company should be allowed to compete with them. They thought that if any profit was to be made, the ratepayers ought to have the benefit of it; and the Vestry considered also that they would be in a better position to make a profit than any company. The Vestry had already obtained the necessary Order for the purpose.

Alderman *T. Eccleston Gibb*, Vestry Clerk of St. Pancras, stated that the Vestry obtained their Order with the *bonâ fide* intention of carrying it out, and had called in to their assistance Professor Robertson. An attempt

had been made by a company to get into the parish; but the Vestry had determinedly said "No." They wanted to retain the lighting in their own hands, because, as they could borrow money at 3½ per cent., it would be much less expensive. They could lay down the installation for the benefit of the ratepayers, and then let it to any company either to manage it for the Vestry or to rent it themselves.

This closed the cases of the objectors.

Mr. Russell Griffiths, for the Commissioners of Sewers, then submitted that, after all the evidence, no case had been made out for the Board of Trade to grant Provisional Orders for either the London Electric Supply Corporation or the Metropolitan Electric Light Supply Company. He had never intended to argue that the City was in such an exceptional position that it was beyond the reach of Parliament; for if Parliament thought fit to grant powers over the City, of course they would have to submit, as they had done in the case of gas and water. Still the Commissioners of Sewers had special powers for the purposes of electric lighting; and the Provisional Orders asked for were contrary to those powers. Evidence had been given to the effect that the City was full of pipes; and there could be no doubt that there would be great difficulty in laying competing mains for electric lighting. There was a great necessity for artificial light all day; and he thought Mr. Preece had convinced the Inspector that it was quite impossible for any one electric light company to supply both the City and the West-end at the same time, as in case of darkness or long-continued fog coming on, a supply of light would be necessary both at the West-end and in the City. The company's power would depend upon its capacity to furnish a constant source of light when it was called upon to supply over the whole of its area for a long time. The troubles of insulation and jointing had been described; and this confirmed the evidence given by Mr. Spencer as to the difficulty of insulation increasing with the tension and high pressure proposed by the London Electric Supply Corporation. He (Mr. Griffiths) submitted that the system was purely experimental, and that the insulation might gradually become insufficient. And not only would there be this danger, but also one of a probable extinction of the light. Another objection was that neither of the Companies asked for authority to supply electricity for motive power; and therefore in the form in which their Provisional Orders stood, they would exclude any customer from using the electric energy for any other purpose than that of lighting. It had been said during the inquiry that nothing in the Orders was contrary to the provisions of the Electric Lighting Act; but certainly the scheme of the London Electric Supply Corporation was opposed to it. By the Electric Lighting Act of 1882, there was a provision by which the undertakers were bound to sell their works within a certain period; and it seemed to him that the effect of the Order was that no local authority could purchase at the end of either 21 or 42 years, or at any time, and that the Company was outside the limits of the local authority, who would be their principal customers. That this was so was shown by the fact of the London Electric Supply Corporation having a station at Deptford, with all the expensive plant collected together, because in the first place there would be an enormous amount of purchase-money necessary to acquire it; and, secondly, it did not come within the provisions of the purchase clauses of the Act of 1882. If a Provisional Order was to be granted without the consent of the local authority, the whole of the generating and other stations should be within the area of the local authority, so that they might have some control over them. This was absolutely necessary in the case of the City. The public lighting was not remunerative to the electric lighting companies; and therefore unless some penalty were provided if the lighting was not carried out properly, a company might get a number of customers, and yet not supply them. As to the minimum price to be charged by the respective companies for light, the reason the companies objected to a compulsory area of supply was because they wanted to serve simply the better class of people.

Mr. Wallace, replying for the Kensington and Knightsbridge Company, said the evidence which had been submitted in support of that Company would justify the Inspector in recommending the Board of Trade to grant them a Provisional Order. With regard to the proposal to limit the period during which the Licence or Order should operate, he said that Licences for seven years were granted for small areas only; and it was absolutely necessary that there should be a much longer term of years if it was desired to carry out the works of electric lighting companies successfully and profitably. If such a short period were enforced on the Knightsbridge Company or any other, they would be unable to obtain the necessary capital to efficiently do their work, and make the investment of the shareholders remunerative. The Board of Trade recognized the principle that Licences for seven years should not be granted for areas which were at all extended. This was the spirit of the recent Act of Parliament; for it was found that the period of 21 years therein specified was too short, and it was extended to 42 years. Therefore the Kensington Company should not be shut out of the benefit of this extension.

Fifteenth Day—Saturday, April 27.

Mr. Wallace, continuing his address on behalf of the Kensington and Knightsbridge Company, said, having dealt with the financial position of the Company, the next question was as to the placing of wires overhead. The Company had not on any occasion placed wires above ground, except within the limits of their own property and on their own works; but they did not know that other companies might not at some time or another wish to fix these wires in their district—in fact, in one or two instances this had already been done. It was very unfair to a Company who were loyally endeavouring to carry out the conditions the Board of Trade had imposed upon them to have any pirating companies coming within the district, and putting up overhead wires. What he suggested was that the rule as to no overhead wires should apply to all companies; and if this was the case, his Company would be quite willing to abide by the provision. As the London Electric Supply Corporation had abandoned Kensington, it was within the range of possibility that they might say they were not now tied—that they could fix overhead wires in the district where his Company were precluded from doing so. If the powers of the Board of Trade were not sufficient in this respect, he would suggest that, in the Confirming Act for all the Orders, provision should be made to secure the total abolition of overhead wires within the district. As to the breaking up of the streets, he submitted that the provision on this point did not require any such revision as was suggested by the Vestry. With reference to the question of subways, his Company would be very glad to see the local authorities deal with the laying of mains of all kinds in the streets. The next suggestion of the Vestry was that the Company should place under their control the selection of the sites for the generating stations. He submitted that this did not apply to his Company so much as it did to other companies, because their stations were the only ones that were within the area in which they had Licences. If any nuisance was caused by the stations, he submitted that it could be dealt with at common law. As to the suggestion that they should agree to the substitution of a court of summary jurisdiction for the authority of the Board of Trade, he did not think such a change either advisable or practicable, because electrical matters could not be properly dealt with by an ordinary Police Magistrate; and they should come before a gentleman of special knowledge and experience. As to the time for the commencement of compulsory works, his clients had no objection to making the period two years. With regard to furnishing maps and permitting testing, they had no objection; but in fairness he considered that the cost of such testing should be borne by the local authorities. To the suggestion that the price should be revised every seven years, the Company certainly objected; considering that such an arrangement was contrary to the spirit of the legislation on electric lighting. There was quite sufficient competition with gas and other illuminants to prevent the question of price bearing hardly upon the persons who desired the electric light, because the companies would be only too glad to encourage a demand for electricity; for, as had been stated in evidence by scientific experts, everything depended upon the amount of light supplied—the cost diminishing according to the demand. Therefore anything in the way of cheapening the light would be quite as much to the advantage of the Company as to the consumer; and they therefore suggested that this matter should be left to the ordinary law of supply and demand. In the case of a gas company who could go on for ever, it might be advisable that there should be a sliding scale of prices; but with electric lighting companies, who were limited to so short a period as 42 years, it would be unfair to insert any such provision. Alluding to the demand for the light, he said the Company had applications for very large quantities; and the persons were anxiously waiting for them to get their mains down in order that they might have a supply. When the Company obtained the necessary powers, they would be able to light the whole district in a very short period. As to the objection that in their Order it was not stated how the electricity was to be produced, he asked Major Marindin to say that the Board of Trade were quite satisfied that the Kensington and Knightsbridge Company would be able to give an adequate supply of electricity. Upon the subject of competition, he suggested that his Company was one that should be left alone, and not be interfered with by any competing companies; so that the Board of Trade might have one Company as a sample undertaking working the direct system, and be able to judge of the results. As to the system of their Company and that of the Chelsea Company, even when they came to examine the evidence of the witnesses against the battery system, Sir W. Thomson, Dr. Hopkinson, and others, had admitted that the system employed by the Kensington and Knightsbridge Company met with their approval, although that used by the Chelsea Company did not. As to the portions of the district they asked the Board of Trade to give them from the House-to-House Electric Light Supply Company, he contended that his Company could work them much better than the other Company, as their station was at West Brompton. His Company were content to confine themselves to the portions of the district for which they already had Licences. Apart from the consent of the Board of Trade, they had a special Licence from the Commissioners of Woods and Forests, which enabled them to light West Kensington Palace Gardens.

Major Marindin: Are you going on with the Notting Hill Company?

Mr. Wallace replied that he was; and, with regard to that Company, he said he would ask the Inspector to assume that most of the arguments he (Mr. Wallace) had used as to the Kensington Company were also applicable to the Notting Hill Company. The only question he had to deal with was as to capital. It seemed to him that the promoters of that Company had gone the right way to work. They had said: "Unless we get a Provisional Order, we put down no capital. We will only subscribe our capital in the event of our getting the Provisional Order, because we do not intend to risk our money and the money of others without having some security that we shall have sufficient tenure to make it pay." Those gentlemen were large owners of property in the neighbourhood; and they had the greatest interest in seeing that the light was properly supplied. They were also interested in supplying it as cheaply as possible, because they themselves would be among the consumers. They were prepared to use the direct system in the same manner as the Kensington and Knightsbridge Company. Certain objections had been made as to the form of Order; but he had dealt with all these when speaking on behalf of the Kensington and Knightsbridge Company. There was no objection to the Company from anyone.

Mr. Shiress Will then addressed the Inspector on behalf of the House-to-House Electric Light Supply Company. He said in the first place he desired to acknowledge the very great care and prudence with which the Local Authority had dealt with the matter; also the great fairness with which their case had been presented. Still he found himself unable to agree with all the suggestions and amendments proposed. First he would dispose of two "pirates" who had been attacking his allotted district from two points. Mr. Wallace had attacked him in two quarters; but he (Mr. Will) contended that they should stand by the decision of the Local Authority, and that the proposed alterations should not be made. If there was any reason in the suggestion that the Kensington and Knightsbridge Company should have the Harrington Gardens piece of the House-to-House Company's area, because the direct system of the House-to-House Company was the best, there was no reason why they should not have the whole of the House-to-House Company's portion. Mr. Moulton's Company also at one time desired to have a piece of the district of the House-to-House Company south of the Brompton Road; but he had not assigned any reason whatever for it. By so doing they were going against the decision of the Local Authority, and asking the Board of Trade to override that decision. He contended, however, that the point was given up by Major-General Webber in his evidence on April 15; and this being the case, he (Mr. Will) submitted that no evidence had been brought before the Inspector that would justify him in ruling contrary to the determination of the Local Authority. Dealing with the objections and suggestions made by the Kensington Vestry, Mr. Will said he thought he could meet them in the matter of overhead wires. They made a very strenuous endeavour to keep overhead wires out of their district unless with their sanction; and he was willing to agree that there should be a clause inserted in the Provisional Order by which they should not put up any overhead wires except with the consent of the Vestry. He might say they had no desire or intention to have any such wires; but, on the contrary, they purposed laying all their wires underground. The Vestry also said, and very properly, that there should be no new station erected in a residential place like Kensington without their approval. His Company were thoroughly in accord with the Vestry on this point. No nuisance, he maintained, could arise from their station at West Brompton; but supposing they were called upon to light other portions of the district, they might have to put up another station. In doing so, however, they would submit to the approval of the local authorities, subject to an appeal to the Board of Trade. The Vestry had also suggested some additions to the Order on the question of finance. He had no fear in regard to this; and he would therefore readily assent to it. With reference to the question of subways, he thought that, if they were made by the parishes, it would be unfair for the local authorities to fix a rent for them, and insist that the companies should pay it. He further objected to the proposal of the Vestry that

they should not be responsible for any damage to the mains when laid in the streets by reason of negligent use of steam-rollers or other heavy traffic. The clause as to this should be modified; and he resisted its very strong wording as it now stood. With regard to the question of price, there was no difficulty raised by the Local Authority, although it was only right to say that they had struck out the provision of the Company for a sliding scale. But this was a matter to be decided by the Board of Trade. The Company pressed for it because they considered it a fair thing. They had faith in it; and it was only right to make an effort to see if it would work. Referring to the question of low-tension mains, the learned Counsel said the alternating system of his Company had distinct advantages in enabling a company to go far and wide; whilst the direct system was only applicable to districts which were compact. The Kensington Vestry desired the insertion of a clause for the purchase of the undertaking, if thought desirable, within 21 years. To this there would be no objection on the part of the Company, provided the purchase was on open arbitration terms. The Company desired to meet the views of the Vestry as far as possible; and they did not wish to have any stations erected in any of the residential portions of the district. As to this, the Company would subject themselves to the wish of the Local Authority; provided an appeal to the Board of Trade was allowed.

Mr. FEMBER: Am I right in saying that your Company will only compete with mine in St. Martin's-in-the-Fields?

Mr. WILL: We did apply for a Licence for St. Martin's; but the time is not ripe for it, and that application is not now before the Inspector. I hope you will hear of it at some future time; but at present it is not a matter of controversy.

Mr. WALLACE, replying for the Westminster Electric Lighting Company, said this Company was in a somewhat analogous position to the Notting Hill Electric Lighting Company, in not raising any capital before they obtained their Provisional Order. This was a wise and prudent course, which could hardly be said of the London Electric Supply Corporation. They were erecting at Deptford a large station, which it was said would light a very considerable part of London; but they would probably abandon certain portions of their area. They would spend the money received from the shareholders and lay down powerful plant upon no security whatever, and were simply waiting to see whether they would get their Order. A great deal had been said about competition and the interests of the public; but he did not for a moment think the suggested competition would protect the public interests. If the London Electric Supply Corporation should succeed (which he considered, after the evidence given before the Inspector, was exceedingly doubtful) in getting a proper system of mains to carry their supply of electricity to London, what would be the result? If they did, they would try to obtain a monopoly, and endeavour to wrest what they could from the Metropolitan Company. The position assumed by the Directors of the Westminster Company was the only legitimate one which should be taken. They said they were not going to allot shares until they had their Order, and would prove to the public what they could do before accepting their money. There was no doubt, however, about their being able to get the capital. As to the various systems, several witnesses had stated that that of the London Electric Supply Corporation was a huge experiment. The learned Counsel then dealt with the attitude of local authorities to his Company, and said that the Vestry of St. George's, Hanover Square, were satisfied, while the Vestry of St. Margaret's and St. John's, Westminster, had refused all companies alike. It was a matter, however, for the Board of Trade to decide as to the Order; and he had brought forward evidence to show that there was a demand for the light in the district. This demand was increasing at a great rate. As to the owners of property in the district, they took a great interest in the question, because they were the persons who would probably require to take the light. It was not likely that the Vestries could work out a system for lighting the Metropolis by electricity; and it was best to leave it to competing companies.

Major MARINDIN: Does your Order include the whole of St. Margaret's and St. John's, Westminster?

Mr. WALLACE: Yes, except such portions as the Kensington and Knightsbridge Company have Licences for; and we abandon those.

Mr. MOULTON, speaking on behalf of the Chelsea Electricity Supply Company, Limited, and the Electrical Power Storeage Company, Limited, said the Chelsea Company had already a Provisional Order, and had begun to work under it. In the case of South Kensington, which they sought to add to the Chelsea area, the local authorities had gone most carefully into the matter, and had laid before the Board of Trade representations in favour of a system of districting. In the case of St. Martin's, in which the Electrical Power Storeage Company were seeking for powers, the Local Authority had left the whole question to the Board of Trade. In Belgravia, the Local Authority, although they did not generally oppose electric lighting in their area, opposed the Company he represented, not from any objection to its Order, or the capability of the Company to do the work it proposed, but on the ground that it desired that any Company who came into the parish should light the whole of it. In Paddington, where the Storeage Company were seeking powers, the Local Authority withheld their consent, on the ground that they thought of doing the lighting themselves. Finally, in the Strand they had the case of a Local Authority who, having several Companies applying to do the electric lighting within their boundary, had selected one Company, and had offered their support to them at a price varying considerably in the proposed form of Order from that which the Company had consented to accept; and at this price the opposition to the other Companies of the Strand District Board of Works had been purchased. The Board of Trade should endeavour to give the companies reasonable-sized areas, so that they should have a local character and fulfil local duties. There was no doubt, as to the question of capital, that the two large Companies were going to make an attack upon the small companies. This matter of capital was thoroughly gone into by the Board of Trade in 1883; and the conclusions which were then arrived at were sound and satisfactory as applied to the circumstances of the present day. The substance of these conclusions was that companies must satisfy the Board of Trade that they had proper and sufficient capital to do the work proposed, and must appropriate the capital to local use, and in nearly all cases they must put down a portion of the capital as a guarantee that they were not idly making applications for Orders without a substantial intention of carrying them out. The Electrical Power Storeage Company had already satisfied the Board as to its financial position, and were ready to satisfy it as to its willingness to appropriate its capital to the purposes of the Order. The Company had only raised £30,000; and with this they had built a generating station which was large enough to supply all their new areas. The amount of the capital, however, was no criterion of the strength of a Company's financial position until it was known how large an area they proposed to light; and this was a very difficult thing to estimate when one company's applications for Provisional Orders included the greater part of London. The main point was the disposal of the capital; and the two Companies he represented were willing to appropriate the money to the local areas which they desired to obtain.

The inquiry was again adjourned

MONTE VIDEO GAS COMPANY, LIMITED.

The Ordinary General Meeting of this Company was held last Friday, at Winchester House, Old Broad Street, E.C.,—Mr. A. K. MACKINNON in the chair.

The SECRETARY (Mr. T. F. Lane) read the notice calling the meeting; and it was agreed to take as read the Directors' report and accounts for the year ending Dec. 31 last, an epitome of which was given in the JOURNAL last week, p. 1011.

The CHAIRMAN: You have been good enough to take the report as read; and I think it will show you that the business of last year was of a satisfactory character. I shall go at some length into details, because this is the first whole year in which the Company has had to face the full effect of the reduction in the price of gas to private consumers, which we decided upon early in the year 1887. The comparison I shall now make will therefore be with the year 1886, which was the last complete year at the old prices. In 1886 we earned from private consumers £54,519. The reduced price on the amount of gas sold to private consumers, if the consumption in 1888 had been only the same as it was in 1886, would have resulted in our being out of pocket to the net amount of £10,904. In 1888, however, we supplied to the private consumers gas at the reduced price to the value of £54,757, or in quantity of gas upwards of 13 million cubic feet more than in 1886; so that you will see that the amount of extra gas supplied has made up the revenue to what it was in 1886. This we consider a very satisfactory result for the first full year of working at the reduced price; for we believe that supplying a cheap light at a low rate is the surest road to the permanent stability of a gas company. There are other items to take into consideration—for example, we have had to use more coal, expend more in labour, and all accompanying outgoings have necessarily been greater; and in addition to this, freights have been considerably higher. But I trust they have now reached their limit. Yet the balance of the revenue account enables us to pay a dividend of 6 per cent. for the year, to write off certain amounts from the capital expenditure account, to place £5000 to the reserve account and £1000 to the insurance account, and to carry forward a balance of about £2000. The percentage of increase in the private consumption of 1888 over 1887 was 17·04 per cent.; and over 1886 it was 25·3 per cent. You will naturally ask me whether I think this percentage of increase is likely to continue; and I unhesitatingly answer that I think it is. For example, the first three months of the present year show an increase of no less than 43·1 per cent. over the corresponding months of the previous year (1888); and although you can hardly expect me to prophesy that it will continue at this rate throughout the year, yet I think we are justified in expecting a very considerable increase. I should here mention, perhaps, that the number of private consumers taking our gas at the end of last year was no less than 12 per cent in excess of the number at the end of the previous year; and this I venture to think is also very satisfactory. Of course, to supply all these wants, the Company must be prepared, and we have already had to enlarge and extend our mains; and much more must be done in this direction in order to meet satisfactorily the increasing demands which are being made upon us. We have also ordered a new gasholder, which will about double our existing storeage power. You will observe from the report that the concession for public lighting has not yet been renewed; and I am unable to say when it will be, although I think we may reasonably hope that a satisfactory arrangement will be arrived at ere long. Our concession for public lighting expired rather more than two years ago; but, as the report tells you, we are still regularly continuing the lighting as before. The Electric Lighting Company, of which you have already heard, obtained, it seems, a conditional concession for the public lighting by electricity in the year 1887, on condition that it carried out the street lighting by eleven months. That period elapsed, and nothing was done by the Electric Company; but the term was extended for a further period of nine months. The Electric Company failed again to comply with their obligations; but the period has recently been again extended for a further term of five-and-a-half months. Against this concession, and also against the extensions of time for completing the same, we have formally entered our protest to the Government, as a violation of article 31 of our contract with the authorities, which gives us the preference on equal terms over any other person or persons offering to undertake the public lighting. I am not in a position to say, nor is anyone, with certainty, how far the electric light in any town will do away with the necessity for gas; but my own belief is—and I think our experience for the last five years or so supports the view—that it is not yet possible to carry out the street lighting of a town by electricity in a perfectly satisfactory, reliable, and economical manner. Now we come to the question of the Government and Municipal indebtedness, which you will see by the accounts amounted on the 31st of December last to £37,198 15s. 10d. But I am very glad to be able to announce to you to-day that the whole of this amount has now been liquidated; and further than that the accounts for the first three months of this year—viz., up to March last—have also been settled. So that I may say that all the Government and Municipal accounts are paid practically up to date. Now, I am sure you will agree with me that this is very satisfactory; more particularly when it is remembered what difficulties we have had to contend with, and what drawbacks we have had to undergo in the past, owing to the, I may say, almost constant heavy indebtedness of the authorities to us. I believe all that is now changed for the better, and that henceforth we shall have no trouble in this respect; for I am sure the Government must see the wisdom of settling such accounts as ours promptly when they are small, and thus preventing accumulations which become more difficult to deal with as they increase. I will just explain how the settlement of the debt, which amounted, as I said before, to £37,198 15s. 10d., has been made. Of this amount, £28,683 10s. 7d. has been settled by the delivery of the *Cuotas de Amortisacion* bonds which are referred to in the report. I shall no doubt be asked if we have taken these bonds at par or at what figure; so I will at once answer the question by anticipation, and say that the cost to us comes out to about 55¼ per cent. You will see, therefore, that there is a good margin for us to realize at a satisfactory figure. I should mention that the rate of amortization is 6 per cent. per annum, carried out monthly by tender; the total of the whole issue not to exceed $2,000,000 dollars. The balance of the amounts due at the end of the year—viz., £8515 5s. 3d.—as well as that due up to the end of March this year, has been received since the report was issued to the shareholders; and the amount is, we learn by telegram, now on the way to England. It must be stated, to the credit of the Government of General Tajes, that the long-standing claim of the Company, dating from the year 1883, has been settled—a debt contracted to a great extent, be it stated, during the former administration; and not only has this been wiped off, but the monthly bills to the end of March have been paid. The Government has disposed that in future the Municipality is to pay us the full amount of the public lighting; and as this Corporation has now a large income, they will have no difficulty in doing so. I presented a petition before leaving, praying that the amount for the gas consumed by the different Govern-

ment departments should be included in the monthly estimates of each department, and the amounts so indicated be retained by the Treasury, and paid to us. In principle, this has been accepted by the Minister of Finance, and no doubt will be carried out shortly. These two arrangements will prevent in the future the accumulations of indebtedness as heretofore, with the subsequent delays and in many cases losses to the Company. A more healthy state of affairs now exists at Monte Video. We have taken the consumers into our confidence, with the happy result of a considerable increase in our consumption. The greatly increased prosperity of the country, as well as the increased population—the City of Monte Video and the suburbs now numbering, according to the late calculation, about 203,000 inhabitants—has, no doubt, come to our aid. Owing to the rapidly increased consumption, I considered it prudent to effect the purchase of land which we badly needed for the uses of the Company; and we have now sufficient for our requirements. At the present price of land, which during the last year-and-a-half has greatly risen in value, our purchases are worth 15 to 20 per cent. more than we gave. These facts will satisfy the shareholders of the value of their investments, and augur favourably for the still greater prosperity of the Company in the future. I beg to propose—"That the report and accounts now read be received and adopted."

Mr. R. Morton, in seconding the motion, said he would take the opportunity of referring very shortly to the large increase which had taken place in the consumption of gas. Respecting the years 1886 and 1888, the highest daily consumption in the former year was 366,000 feet; and in the latter year it was 427,000 feet, or an increase of more than 16½ per cent. in the two years. Now, the increase of consumption or the first quarter of the current year, as compared with 1888, was at the rate of 43 per cent.—somewhat alarming, he might almost say, and showing that they must look forward to provide for this, which, as the Chairman had said, and as the figures he (Mr. Morton) would lay before the shareholders would show, necessitated a considerable outlay. At the present time they had three gasholders, with an aggregate capacity of 262,000 cubic feet. For safe and good working it was necessary that the gasholder capacity should be equal to the heaviest consumption in 24 hours in the year. The consumption at the present moment, or rather the heaviest daily consumption in 1888, was 427,000 cubic feet, which was nearly double the gasholder capacity. This was a very unsatisfactory state of things, and had led to the ordering of another holder, of a capacity equal to 228,000 cubic feet. This would nearly double their present holder accommodation; making the total 490,000 cubic feet. However, he did not think, looking at the increase that was going on, that this would be equal to 24 hours' consumption next year. The holder which was now being made in England, and which they hoped would be despatched in the course of a month or two, was the largest that could be placed on the ground available. If they had had a more extensive piece of ground, they would have utilized it, and put in a larger holder. Referring to the length of the mains, at the end of 1887 there were 75 miles of mains of sizes varying from 15 inches down to 2 inches in diameter. During 1888, 2 miles of additional mains had been laid, and there were delivered and on the way to be laid as soon as the Engineer could get them down, some 17 miles more. With the 2 miles laid and the 17 miles to be laid, there would be an increase of 25 per cent. in the mileage of the mains. What the consumption would be after the 17 miles were laid they could not forecast. He thought it would be much larger than during the past year. These were the reasons for the Company looking forward to something better than they had been enjoying in the past. When the Engineer (Mr. John Ohren) arrived in Monte Video at the end of 1887, he found that in several districts of the city the supply of gas was very defective; and he at once set about remedying this by increasing the pressure at the works. This was a costly way of working, because the higher the pressure, the greater the amount of unaccounted-for gas. As soon as he possibly could, he took up one or two of the small mains, and laid some arterial mains of larger size, so as to give a better pressure to those districts which had a deficient supply; and this accounted very much, he (Mr. Morton) believed, for the large increase of consumption that they were having from month to month. After having laid these larger mains, he was able to very materially reduce the initial pressure, which he had previously to increase to give a supply through the smaller mains; and he now reported that they had very satisfactory pressures throughout the city. He only wished to say further that the Directors were well satisfied with the way in which their new Engineer had taken up his duties, and was carrying them out. It was perhaps too soon to say very much; but certainly a very considerable amount of this immediate large increase in consumption was due to the action of the Engineer in the way he had indicated.

Mr. Denby inquired what was the position of the dock business.

Mr. Matthews said he thought that everything the Chairman had said was rosy and bright for the shareholders; but he contended that there was one weak spot. He had always considered that the Company was too heavily capitalized—certainly for the interests of the shareholders. It appeared also from the report that the progress of the Company was highly satisfactory as far as the consumption of gas was concerned. The extensions that Mr. Morton had referred to would, he presumed, cause a large increase in the capital account. He should be more satisfied, if this increase of expenditure was taking place, if they had a more satisfactory tenure. He spoke at some length in reference to the time allowed to the Electric Light Company for introducing the light; and said that, after the consideration the Company had given to the Goverument when they were in an impecunious condition, he thought they had treated them unfairly in this matter. He did not know whether the Company were justified in expending very large sums of money in extensions, unless there was something more satisfactory in their tenure. Having allowed the Company to open the roads and lay mains and erect works, he supposed the Government would be bound to give them compensation if they sent them away. He regarded the insurance fund of £10,000 as a very satisfactory feature.

The Chairman, referring to the dock business, said it would be seen that the revenue last year was considerably above that for the previous year. In regard to the extension of time granted to the Electric Light Company, he said that the Board considered this unjust, because, in view of article 31, which gave the Gas Company the priority of lighting, before the Government granted a further extension to the Electric Light Company they should have applied to the Gas Company. They had entered their protest against the extension. He (the Chairman) submitted to the Government the basis of a new concession before he left Monte Video. The Minister said he would enter into the question, and see what could be done; and there were great hopes that before long an arrangement would be made that would be a more favourable one to the Company, the Government, and the consumers; for they must all work together in harmony. In conclusion, he mentioned that the increased consumption for March last over the corresponding month of 1887 was 54 per cent.

The motion was unanimously carried.

On the motion of the Chairman, seconded by Mr. T. C. Tatham, a dividend for the half year ending Dec. 31 of 12s. per share, free of income-tax, was declared; making with the interim dividend 6 per cent. for the year.

The Chairman proposed, and Mr. Tatham seconded, the re-election of the retiring Directors (Mr. Simpson Rostron and Mr. W. O. Dodgson) and the proposal was unanimously agreed to.

Mr. Rostron and Mr. Dodgson having acknowledged the continued confidence of the shareholders in them,

The Auditors (Messrs. Price, Waterhouse and Co., and Mr. E. Cheshire) were reappointed on the motion of Mr. Rolandi, seconded by Mr. Matthews.

The usual votes of thanks were accorded to the Chairman and Directors and the officers; and the proceedings then terminated.

BUENOS AYRES (NEW) GAS COMPANY, LIMITED.

The Annual General Meeting of this Company was held last Tuesday, at the London Offices, 1, East India Avenue, Leadenhall Street, E.C.—Sir Wilford Brett, K.C.M.G., in the chair.

The Secretary (Mr. E. W. Layton) read the notice convening the meeting; and it was decided to take as read the Directors' report and the statement of accounts for the year ending Dec. 31 last, an epitome of which was given in the Journal for the 21st ult., p. 964.

The Chairman, in moving the adoption of the report and accounts, said the profits of the past year amounted to £101,103, as against £77,648 in the previous year—being an increase of £23,454. To the profit had to be added the sum of £6979 brought forward from the preceding year; making a total of £108,082. From this had to be deducted the debenture interest of £12,000; the amount written off, being the balance of reorganization of mains account, £9049 10s.; amount written off, being the cost of new purifiers, £1649 18s.; the loss on exchange, £45,400 13s.—making a total of £68,100, and leaving a balance of £39,982 to be dealt with. The Directors recommended that a dividend be paid of 8 per cent. (free of income-tax), of which 3 per cent. had already been distributed; leaving 5 per cent. to be now paid in respect of the last six months of the year. A balance would remain of £10,726, from which the Board recommended that £2000 be carried to the reserve fund; thereby increasing it to £56,254. They also recommended that a bonus of 4s. per share be paid upon the old shares, and 2s. per share upon the new issue; leaving £1166 to be carried forward. This bonus would raise the total amount paid on the shares to a sum equal to 10 per cent. To the question of the form in which the dividend should be declared, the Directors had, he said, given their most careful and anxious consideration; and they were of opinion that, in the presence of the fluctuation in the premium on gold—the uncertainty of which was ever present—it was to the interest of the shareholders that the dividend should be declared in the way they now recommended. In giving expression to this opinion, he wished to guard himself by saying that, forecasting an estimate on the data of the past, in his judgment this bonus of 2 per cent. could be, and would be, maintained in the future. In support of this, he pointed to the fact that the loss on exchange in the past year was £45,400, and in 1887, £28,053; and yet they had been enabled to recommend a dividend at the rate of 10 per cent. Looking at the marked increase in the value of their business in 1888 over previous years—the receipts for gas being 31·28 per cent. greater than those of 1887, while those for private consumption amounted to 86·19 per cent. over those of 1886, he thought the Directors could congratulate the shareholders upon the continual improvement in the earning power of the Company. They were now making and distributing something like a million cubic feet of gas a day. Adverting to the figures of the past, he said it might interest the shareholders to learn that the income had year by year been steadily progressing—that, whereas in 1878, the total income was £59,502; in 1884, it was £101,390; and in 1888, it had risen to £239,773. To put it into words, the income doubled itself in the six years from 1878; and that had again been doubled in the past three years. If there was any significance in figures, he considered that these were eloquent in their favour. Comparing the results of the working with the previous year, the gas receipts showed a difference of 31·28 per cent. increase over 1886; and the private lighting an advance of 86·19 per cent. With regard to the consumption of gas last year, they supplied to the private consumers 43,355,000 cubic feet more than in 1887; and there was a considerable increase in the public lighting also. They had fixed and lighted an additional 912 public lamps in the year; and had laid 34 miles of new mains. The bad debts remained much as before; and the unaccounted-for gas was about the same as in 1887—12·58 per cent.—a vast improvement over former years. The quantity of gas produced per ton of coal carbonized exhibited an increase of 452 cubic feet—speaking very favourably of the skill of the Company's present Manager. For the residual products, they had received £24,589, as against £21,996. Alluding to the change in the management, the Chairman said Mr. George E. Stevenson retired from the service of the Company during the past year and the Board appointed Mr. Lewis T. Wright (late Manager of the Notingham Corporation Gas-Works) as Engineer and General Manager. Mr. Wright assumed charge of the works in October last. In taking them over, he had a great many difficulties to face; but he met them with promptness and discretion. He had shown himself to be a very valuable Manager; and the Board thought they had been fortunate in having acquired his services. In order to meet the increased consumption of gas, they had added to the plant a retort-house, another station meter, condensers, washers, exhausters, and other minor accessories. They had purchased, on favourable terms, 9305 square metres of land adjoining the works; and also the gas offices in Calle Alsina—this being an important acquisition to the Company's property. Respecting a visit which one of the Directors—Mr. J. Conrad im Thurn—had recently paid to Buenos Ayres, the Chairman said that gentleman had gained much local information which would be of great use to the Board; and he had brought away with him a favourable impression of the Company's business and property. Reference was also made by Sir Wilford to the valuable services that Mr. Charles im Thurn had rendered to the Company. During the past ten years he had held a very responsible position at Buenos Ayres; being one of the three members constituting the Local Committee, and acting as Secretary over there. He had received only a nominal salary; and now that he had retired, the Board felt that they might fairly offer him some recognition of his great services to the Company. The Directors proposed, with the shareholders' concurrence, to present him with £1000. He mentioned that there was some little sensitiveness in dealing with this matter before, on account of Mr. Im Thurn's relationship with a member of the Board; but he (the Chairman) thought the time had arrived when they should recognize the faithful work which that gentleman had performed. There was one other point he had to bring before the shareholders; and it was this—that, in view of the increasing business of the Company, and the very considerable capital expenditure thereby entailed, the Directors had determined very shortly to issue the balance of the authorized capital, which would be offered *pro ratâ* to the proprietors at such rate of premium as the Board might think advisable.

Mr. F. J. Hesseltine seconded the motion.

Mr. Peasgood said he thought it must be gratifying to the shareholders to have such a satisfactory report laid before them. There was one point he desired to allude to, and that was the question of leakage. The Chairman had stated that this was 12 per cent.; but in his opinion this was a very large amount, seeing that they had been spending a considerable sum of money in the reorganization of the mains and services. He urged the Board to give careful attention to this matter; and hoped they would be able to reduce it to 5 or 6 per cent.

The Chairman assured the shareholders that both the Board and their Engineer would direct their attention to this question. With their 134 miles of mains, he could hardly hope to get to the low percentage named by Mr. Peasgood.

Mr. Heseltine, replying to a question as to the £9049 written off in respect of reorganization of mains, said that this sum was only a portion of the charge on revenue account for this purpose; but the amount completed the charge. He also pointed out that, since the reorganization of the mains had been carried out by Messrs. J. Aird and Son, the leakage had been reduced from 38 to 12 per cent.

The motion was then carried unanimously.

On the motion of the Chairman, seconded by Mr. J. C. im Thurn, the dividend and bonus recommended by the Directors was declared.

The retiring Directors (Messrs. F. J. Heseltine and R. Nesham) and Auditors (Messrs. Turquand, Youngs, and Co.) were reappointed; the remuneration of the latter being advanced to 100 guineas per annum.

The Chairman next proposed a resolution to the effect that, in recognition of the long services of Mr. Charles im Thurn as a member of the Local Committee, he be presented with a sum of £1000, accompanied by a cordial vote of thanks.

Mr. Stephenson Clarke seconded the proposal, which was at once agreed to.

A long discussion took place on a proposition of Mr. Stephenson Clarke to present the Directors with £1000 in view of the prosperous working of the concern during the past year, and of the increased attention which they had had to bestow upon it. As an amendment to this proposal, it was moved that the remuneration of the Board be raised from £1500 to £2000. Eventually, however, the amendment was withdrawn, and the motion was agreed to.

The Chairman subsequently stated, in reply to a question, that the balance of the authorized capital unissued consisted of 7262 shares, which would be distributed *pro ratâ* among the shareholders; but he could not yet say what the premium would be.

The usual acknowledgment having been made of the services of the Chairman and Directors, and the officials and staff, the proceedings terminated.

BELGRANO (BUENOS AYRES) GAS COMPANY, LIMITED.

The Ordinary General Meeting of this Company was held at Winchester House, Old Broad Street, E.C., last Friday—Mr. F. A. Hankey, M.P., in the chair.

The Secretary (Mr. H. M. Gerrard) read the notice convening the meeting. The report—which it was agreed to take as read—stated that, after deducting £7851 14s. for loss on exchange, of which £6482 had been re-credited to capital account, representing the gold premium on expenditure in Buenos Ayres, and £1800 interest on debentures, £2000 had been written off to depreciation account; and the Directors recommended a final dividend of 4½ per cent. on the old shares and 2¾ per cent. on the new shares, which were entitled to rank for dividend from the dates of payment of instalments, equivalent to four months on the full amount of the shares. This makes a distribution of 8 per cent. for the year, and will absorb £5566, leaving £2610 to be carried forward. The Company are now erecting a new holder, retort-house and coal-stores, scrubber, condenser, governor, exhauster, &c.; and large relieving mains, which were urgently required, are also being laid.

The Chairman, in moving the adoption of the report, spoke of the great progress which the Argentine Republic was now making. The Company, he said, had felt the influence of this; and the Directors had to report a great increase in the consumption of gas, an addition to the private consumers, and a further demand for gas for public purposes. The increase in consumption, as compared with that of 1887, amounted to 41 per cent.; and was more than 100 per cent. above that of 1886. He pointed out that they had had great difficulties to contend with during the year, in supplying this increased demand, owing to what he might term the paucity of the means to enable them to do so. Their plant was not at all adequate to the present requirements of their customers; and they would have to provide for these.

Mr. A. Hooper seconded the motion.

The Chairman, in replying to a question, said that the Company had at the present time a Bill before Parliament which would enable them to obtain a quotation on the Stock Exchange.

The motion was unanimously agreed to.

The retiring Director and the Auditors having been re-elected,

On the motion of the Chairman, seconded by Mr. Hooper, the following resolution (among others making certain alterations in clauses of the Articles of Association) was passed:—"That for the purpose of providing for the cost of new plant and extensions of the Company's works, and for all other purposes of the business and undertaking of the Company, the nominal capital of the Company be increased by £50,000, divided into 5000 shares of £10 each, under and subject to the existing regulations of the Company."

The usual acknowledgment of the services of the Chairman and Directors was made by the shareholders; and the proceedings terminated.

BRITISH WATER GAS SYNDICATE, LIMITED.

An Extraordinary General Meeting of this Syndicate was held last Thursday, at Leeds—Mr. Samson Fox in the chair.

The Chairman, in opening the proceedings, said the shareholders had been called together to confirm the resolutions passed at the meeting held at the Cannon Street Hotel, London, on May 14 (see *ante*, p. 959), in order that they might work in accordance with the requirements of the London Stock Exchange. What he said at that meeting as to their affairs and prospects had been a good deal criticized; but up to date he had not met with anyone capable of saying that he set forth anything other than truth and fact, as they knew it by the apparatus which had been at work for the past 16 or 17 months at the Leeds Forge. There was no difficulty in repeating what had been done so successfully there, and at every other works in the country; and it was necessary that they should all put on one side Stock Exchange rumour and action. The action of certain buyers and sellers of shares had sometimes an effect which was not so rosy as it might be; while at other times it was far too rosy for sound business. Nobody felt more annoyed than he did that these shares should ever have been run up by the public to a price of £21 premium on a £5 share. No one in his senses could expect that they, who had to start the business, turn out plant, and produce results on a commercial scale, could possibly be able to give them that dividend on this sum of money paid for a £5 share. He could tell them that he had been a buyer of shares right away through their fall; and he was still a holder, and would continue to hold until he had shown that water-gas manufacture had in it what he had said it had. He had made up his mind to work out the problem of solid fuel *versus* gaseous fuel; and it should be done by the use of water-gas plant. There was no difficulty about it. What they chiefly wanted was patience, and a little time to get a few plants at work in various places. They had already orders from all parts of the country to put down plant for every conceivable kind of lighting and heating. Their works in Scotland were thoroughly going; and they were engaged in building at least 20 plants for making water-gas. As time went on, they would make known the results; and if they showed half the good results the venture had in it, the shareholders would all be well paid for what they had laid out in the investment, providing they had not been so foolish as to buy at too high a price. The parent Company had nothing to do with the price the public paid. They gave each one his share for £5; and if the public thought them worth more, it was for them to be careful. He concluded by expressing his satisfaction with the prospects of the parent and the subsidiary Companies, which latter would, he said, profit by the disposition on the part of many large firms to pay so many hundreds or thousands of pounds down for a perpetual licence, instead of a royalty on the consumption.

The resolutions passed at the previous meeting were then confirmed; and the proceedings closed with a vote of thanks to the Chairman.

TRUSTEES IN BANKRUPTCY AND THEIR LIABILITIES.

Dispute over an Unpaid Gas Account.

A short time ago a case of peculiar interest to gas companies was brought before Sheriff Birnie in the Sheriff Court, Hamilton, in which the Bothwell and Uddingston Gas Company were cited as defenders, under the following circumstances:—A person carrying on business as a shoemaker took a shop in Royal Buildings, Uddingston, and entered into occupation at Whitsunday term, 1888. He put in a much larger stock than he was able to pay for. Towards the end of the summer, certain of his creditors began to push him for payment of their accounts; and he was compelled to avail himself of the assistance of a law agent. Following this a trust deed was signed, and meetings of creditors were held at which offers of composition were made. For a time the trustee carried on the business, paying the bankrupt 30s. weekly as wages. Finally the trustee had to put the trust deed in force, and shut up the shop. All these proceedings were carried on without any notice having been given to the Gas Company, whose gas had been used on the premises. The trustee therefore rendered himself liable for payment of their account in full; and accordingly the Company's Manager applied for it. The trustee, however, refused to do anything more than rank the Company amongst the ordinary creditors. The gas was cut off, and intimation given that no more would be supplied until Whitsunday to anyone who might want to occupy the shop, unless the Company's account was paid in full. Within a few days the trustee disposed of the stock, and let the shop to another tenant, who applied to the Company's Manager to put on the gas. This he refused to do until their account was paid; and he referred the applicant to the trustee. This gentleman still declined to pay; and the Manager refused the supply of gas. At this stage the new tenant at once offered to pay the account; which the Manager accepted. He at once laid on the gas; at the same time taking a deposit of £3 as security for future payment. The trustee then induced the new tenant (Mr. Dewar) to raise an action in the Sheriff Court, Hamilton, for recovery of the money paid; stating in the summons that he had paid the account under protest, which was untrue, as was proved by his own admission. It thus seemed that there was no case in law for the pursuer—the new tenant acting under the influence of the trustee. Sheriff Birnie, before whom the matter came, seems to have taken up a position of antagonism to the Company even before the case was heard at all, as he stated in open Court to the Company's agent that he was against him. This gentleman asked the Sheriff not to prejudge the case, but to hear it. On the following Court day the case was heard; and again at the opening the Sheriff told the Company's agent that he was against him. After the case was heard, finding that the pursuer had no case against the Company, the Sheriff said he would take a week to consider his decision; stating that if he could do it at all, he would decide against the defenders. In consequence of the remarks made by the Sheriff, the Directors of the Company at once decided not to allow him to give a decision on the case; and, contrary to the advice of their agent, they handed back the amount reclaimed, together with the expenses of the pursuer. They will now pursue the trustee for payment of the account, should he still refuse to pay. The defenders' argument was that, being a non-statutory Company, they were not bound to supply; also that, the pursuer having paid the account for the gas consumed, he was not entitled to recover it from the Company, and that they were entitled to make their own terms, the same as any other trader. The Sheriff tried to show that the defenders, having once made a connection, were bound thereafter to supply gas; to which the Manager replied, "Only if we are paid for it." The Company have not been in the habit hitherto of asking for deposits; but it is likely that they will do so henceforth, as they have incurred too many losses.

The Linacre (Liverpool) Gas-Works Railway Branch.—The powers sought by the omnibus Bill of the Midland Railway Company to construct the short, though important, line in Bootle, and to be known as "the Linacre branch," which in the House of Commons was opposed by the Leeds and Liverpool Canal Company (see *ante*, p. 765), was passed last Tuesday without opposition, by a Select Committee of the House of Lords. The main object of this line, which commences with the Midland Company's goods branch at Bootle, and terminates at the Linacre Gas-Works, is to put the latter in connection with collieries, especially those of the South Yorkshire district, producing gas coal.

The Free Fixing of Gas-Stoves.—At the recent successful gas exhibition held in Workington, prospective customers for gas-stoves were informed that these appliances could be obtained on hire, and that they would be fixed free by the Corporation. The result was that about 80 cookers were ordered. The hiring charges were about 10 per cent. on the cost. At the close of the exhibition, the Gas Manager (Mr. H. Lees) obtained a small supply of the cookers, and had a number of them fixed. The Gas Committee then found that they were sinking too much capital—that, in fact, to "fix free" was a mistake; and they wanted to make fresh arrangements. One portion of the Committee were in favour of adhering to the original proposal, and risking the loss, while the other desired to substitute a five-years' hire-purchase system. In the meantime, the Manager was instructed not to order or fix any more ranges. Considerable dissatisfaction was felt by those who had ordered ranges. Eventually a special meeting of the Town Council was held, when, after nearly three hours' discussion of several resolutions, it was decided to let all those who had ordered cookers have them on the terms originally agreed upon, and to supply any future orders on a five-years' hire-purchase system.

MANCHESTER CORPORATION GAS SUPPLY.

REPORT OF THE GAS COMMITTEE FOR THE YEAR ENDING MARCH 31.

We have been favoured by Mr. Charles Nickson, the Superintendent of the Gas Department of the Manchester Corporation, with a copy of the report and statement of accounts of the Gas Committee for the year ending the 31st of March last. The Committee report as follows:—

The total quantity of coal and cannel carbonized was 303,617 tons; yielding, per ton of coal and cannel carbonized, 10,308 cubic feet of gas, of an illuminating power of 20·14 candles. 3,108,269,000 cubic feet of gas were transmitted from the works. The rate of increase for the six summer months (with, of course, a comparatively small consumption) was 5·74 per cent.; for the six winter months, 0·42 per cent.; and the increase for the year is 2·05 per cent.

The number of gas-stoves and other heating appliances out on hire is 1760; the quantity of gas consumed in their use is estimated to be about 16,250,000 cubic feet; and the revenue derived therefrom is about £2500 per annum.

2,932,959,000 cubic feet of gas have been measured and accounted for; and 175,310,000 cubic feet (or 5·64 per cent.) are unaccounted for, owing to leakage and condensation, as compared with 4·85 per cent. last year.

There are now 9954 public lamps in the city, 1583 of which are of the improved pattern, and give great satisfaction to the public.

The amount received for gas-rents, meter-rents, and stove-hire within the city was £278,548 13s.; and beyond the city (including public lamps), £105,765 8s. 6d.—making a total of £384,314 1s. 6d., and showing an increase of £3074 over last year. The sales of coke, tar, and ammonia water amounted to £67,854 16s. 11d., or £7195 0s. 2d. over the amount for last year. The total cost of street lighting within the city was £29,387 9s. 2d., as compared with £29,471 18s. 2d. last year.

After writing off £33,264 0s. 11d. for depreciation, deducting the fixed charges for interest, £28,403 9s. 3d., street lighting, wages, and repairs, £7874 5s. 3d., sinking fund, £26,454, and £25,000 paid to the city fund account during the year, there remains an amount of £17,748 8s. 4d., which has been transferred towards the liquidation of the adverse balance on profit and loss account in past years; thus reducing such balance from £27,931 14s. 3d. to £10,183 5s. 11d.

In view of the unsettled state of the various illuminating agents, and the possibility of gas being to some extent superseded, your Committee, after much inquiry and discussion, have thought it desirable for the present to continue both the depreciation and sinking funds.

The financial results of the year's working are so satisfactory that, in addition to continuing the usual fixed payments, your Committee are able to recommend to the Council that from the 24th of June next the price of gas be reduced, both in and out of the city, 2d. per 1000 cubic feet. This will represent a reduction in revenue to the amount of about £24,000 per annum, a considerable portion of which, however, they anticipate will be made up by an increased consumption of gas.

The questions relating to the supply of the electric light are under the consideration of your Committee; and the improvements which have taken place in the production and management of this illuminant, and the conditions upon which it can be supplied, may justify your Committee in arranging for its adoption to some extent. They will report to the Council in reference to this matter on an early date.

[The accounts, audited by Messrs. Lees and Graham, and the usual statistical statements given in the appendices thereto, follow the report. Our usual extracts therefrom will appear next week.]

THE LONDON COUNTY COUNCIL AND THE COAL DUES.

At the Meeting of the London County Council last Tuesday—Earl ROSEBERY in the chair—the Parliamentary Committee submitted a report which contained the following paragraph in reference to the London Coal Dues:—"The attention of your Committee has been directed to the Coal Duties (London) Abolition Bill, which was read a second time on Wednesday last [May 22], and committed to a Select Committee, who will be called upon to decide whether the claim of the City of London to a continuation of the 4d. duty, to which they assert a right under charter, can be substantiated. Your Committee are strongly of opinion that it should not; and they have passed the following resolution, which they submit for the information of the Council:—'That this Committee are of opinion that any claim of the City, legal or equitable, to any coal dues, or to any charges in respect of coal, ought not to be recognized by the Council, and should be opposed.'"

The CHAIRMAN observed that the recommendation of the Committee was somewhat objectionable from two points of view. First of all, the paragraph was not quite grammatical; and the report and the recommendation were not quite consistent. The Committee stated that the Select Committee would be called upon to decide whether the claim of the City could be substantiated; and the Parliamentary Committee stated that they were of opinion that it should not be, whereas they perhaps meant to express the hope that it might not be. However, apart from these points, the matter was one which related to the City, and came under the rule by which he ought to vacate the chair in favour of the Deputy-Chairman (Mr. Firth).

Lord Rosebery then left the chair, which was taken by the Deputy-Chairman.

Mr. HARRISON, Chairman of the Parliamentary Committee, moved a resolution to the effect that the recommendations of the Committee be approved, with the addition of the following rider:—"That it be referred to the Parliamentary Committee to take all necessary steps to ensure that the Council be represented before the Select Committee considering the coal dues."

Mr. COHEN and Mr. HARBEN both objected that this proposal was something additional to the Committee's recommendation.

Mr. J. BECK was of opinion that the best thing the Council could do was to expunge the objectionable paragraph altogether. It was utterly ungrammatical, and the sentiment contained in it was entirely inconsistent with modern ideas of civilization. It was really monstrous that the Council should be asked to pass a resolution which stated definitely that the claims of the City, either "legal or equitable," ought to be opposed. Of course, if they could show that the claims were illegal or inequitable, then by all means let the Council oppose them. But it was not so. He had hoped that when the Committee came to approach the question of the coal dues, they would have given the Council a little more exact information on the subject, and something also that was "legal and equitable." Therefore he should propose, as an amendment—"That the paragraph in the report be expunged altogether, and that the Committee be asked to bring up something more grammatically worded, and more in accordance with common sense."

The DEPUTY-CHAIRMAN suggested that the words of the amendment should be—"That the paragraph of the report of the Committee be disagreed with."

Mr. H. CLARKE observed that it was not desirable for the Council to renew the debate on the subject of the coal dues, now that they had decided that they should be discontinued. He rose to speak on the subject not as a member of the Corporation, nor as a representative of the City, but as one of the members of the Council; and he would ask them to consult their own dignity and self-respect by expunging so unwise a proposal as that which the Committee recommended. They were but a young body; and were they going to exhibit themselves to the world as unwilling to do that which was "legal and equitable?" They ought to be ready to do that which was equitable, fair, and just; and therefore he hoped the Council would not agree to the recommendation of the Committee. He would second the amendment proposed by Mr. Beck.

Sir T. H. FARRER entirely denied the title of the City to the claims made for it by its advocates in respect of the coal dues, or any charges in respect to coal. The Committee had taken Counsel's opinion, and the advice given to them was that the City had no chance whatever of maintaining their claim to the dues, and that if the question came into a Court of Law they would be beaten. The City had no right to the dues; and, notwithstanding the support they had received in the past from the Metropolitan Board of Works and the Government, their claim ought not to be conceded. The Committee therefore asked the Council to give them power to go before the Select Committee of the House of Commons to oppose the claim, on grounds both of legality and equity.

Mr. H. H. MARKS stated that when the question of the abolition of the coal dues came before the Council for full discussion he had voted for their abolition. He did not think the Council would ever have cause to regret the decision they arrived at on that occasion. However, he was sorry to see the paragraph in the report of the Parliamentary Committee, as it was undignified, and was likely to bring the Council into contempt. He was therefore in favour of expunging it; and at the proper time he should move that it be referred back, because its grammar, logic, and law, were defective.

Mr. B. L. COHEN, referring to the opinion quoted by Sir T. Farrer, said that those who thought with him (Mr. Cohen) had also taken Counsel's opinion, and it was in favour of the claim made on behalf of the City.

Mr. J. BEAL contended that the City had no charter rights whatever which would justify them in claiming the dues; and the Council ought to fight to the uttermost, and to the limit of their resources, the position taken up by the City.

Mr. HARBEN also proposed an amendment, as follows:—"That this Council do appear by Counsel before the Select Committee appointed by the House of Commons, to represent the views of the Council on the subject of the coal dues."

This and several other amendments were lost, and ultimately the Council passed the following resolution, proposed by Mr. LAWSON:—"That the Parliamentary Committee be empowered to instruct Counsel to appear before the Hybrid Committee of the House of Commons in favour of the Coal Duties (London) Abolition Bill."

THE PROJECTED ELECTRIC LIGHTING SCHEME FOR LEEDS.

In accordance with the instructions given him by the Electric Light Committee of the Leeds Town Council (*ante*, p. 963), Mr. T. Hewson, M. Inst. C.E., the Borough Engineer, has prepared a report on the question of lighting by electricity the business centre of the town. This he submitted to a meeting of the Committee on Wednesday last. It contains a record of the proceedings of the Committee since the year 1883, when the Council granted to that body a sum of money for experimental and other purposes. The report set forth that the Committee had visited London and other places, in order to ascertain what was being done or about to be done in regard to the adoption of electricity as an illuminant, and referred to the various improvements which had been made in electric lighting apparatus since the date mentioned. The question was laid before the Committee for consideration as to whether the supply of electricity for lighting should be undertaken by the Corporation as the local authority, or be left to one or more of the public companies established for the purpose. It was pointed out that, unless the Corporation undertook the duty, the field must be left open to the competition of companies, as the objection of the local authority to electric lighting on the ground that its introduction would be calculated to damage their gas undertaking would not hold good in the face of a desire on the part of the inhabitants to be supplied with the light. Mr. Hewson suggests the expenditure of the sum of £61,000 in the establishment of a central electric lighting station; that the "Midden" should be utilized for that purpose; and that the light should be supplied to the business centre of the town and a limited area of residential districts surrounding, so that the plant may be used for domestic lighting beyond the hours during which professional men and tradesmen have any use for it. It was decided that the report should be printed for circulation among the members of the Committee, and that its further consideration should be adjourned to the 12th inst. On that date the report will probably be adopted for submission to the Town Council at the following meeting; and it is thought that the discussion of the question by that body will turn mainly upon the point as to whether the electric light should be supplied by the Corporation or by a public company.

STAFFORDSHIRE POTTERIES WATER-WORKS COMPANY.—In the repor presented by the Directors of this Company at the annual meeting, at Hanley, last Wednesday, it was stated that there had been an increase of rental of £476. The balance for the year, with the addition of £1169 brought forward, made a total of £16,963, from which had to be deducted the interim dividend of 3 per cent., paid in December last, leaving a present available balance of £9613, out of which the Directors recommended a dividend of 3 per cent. for the half year ending March 25 last (free of income-tax). Under the powers of the Company's Act of 1888, stock had been issued to the amount of £20,000, which realized a premium of £3450. These two amounts, it was stated, would be applied to the construction of new works. The new works at Hatton were being proceeded with; and the results of the boring and sinking showed that a large supply of excellent water would be obtained. The report was adopted; and the dividend recommended declared.

NORTHERN COAL TRADE.—During the past few days some of the largest coal contracts have been fixed; and there is now, with a very large production, a fairly good demand for the season of the year. For steam coals, the price, however, is a little easier; 9s. 6d. being the current rate for best qualities, and 9s. to 9s. 3d. for second qualities. Small steam coal is very scarce, and commands from 4s. to 4s. 3d. per ton. In gas coals, there have been at least two large contracts closed during the past few days—one being for a large south-country company; and it is said that 7s. 6d. is about the price of the coal under the new contract, which would be fully 1s. above the figure under the expiring one. In the case of the other contract—that for a Teesside town—an increased price is certain; but it is expected that it will be made known in the course of a week. The gas coal collieries of Durham are now fully expecting that, after the end of the present month, they will have to pay a substantial increase in the rate of wages. There is very little change in the coal trade in other branches; but the tendency of prices is rather firmer.

THE BIRMINGHAM GAS COMMITTEE AND CORPORATION TRADING.

The Committee's Report.

At the Meeting of the Gas Committee of the Birmingham Corporation yesterday week, the Finance Committee presented a draft report on the question of Corporation trading in gas-fittings—a subject which, as our readers are aware, has been of late considerably agitated by the local gas-fitters and those dealing in gas appliances. The report was unanimously adopted; and it will be introduced and discussed at the monthly meeting of the Council to-day.

It will be remembered that a memorial was received by the Council from the Committee appointed by the local gas-fitters and tradesmen, stating that the sale and fixing of gas-fittings by the Corporation inflicted ruin on private traders by its unfair and unjust competition, while it brought no adequate profit to the ratepayers. This memorial was referred to the Gas Committee; and the first step they took was to invite a deputation from the Gas-Fitters' Committee to meet them on March 22, when they were asked to offer any observations upon the subject of the memorial. The deputation thereupon stated that they did not intend to submit evidence of individual cases of hardship, but would rely on the broad principle that the Corporation Gas-Fittings Department was wrong in principle. They demanded that the department should be given up, and stated that nothing short of this would satisfy them. "In the course of the discussion," says the report, "the deputation stated that they did not object to the charges for the day work carried on by the department, which are reasonable, but that their objection is to the underselling by the Corporation on contracts; that they were satisfied with the state of things under the Gas Companies, as they then got their fair share of the trade; but that the competition of the Corporation is decidedly worse than that of the Companies, is getting worse year by year, and private fitters are being driven out of the trade by this competition. They stated that they believe the position of private gas-fitters in Birmingham to be exceptional, as no other corporations and none of the larger gas companies undertake fittings work; and that in their opinion the Corporation do three-fourths of the work of the town. The deputation instanced as illustrations of the hardship to which they believe they are subject, the sale of gas-stoves, the laying of private services, and the fixing of meters exclusively by the Corporation, and the fixing of hot-water apparatus, to each of which branches of the fittings business particular objections were raised. They also named, in support of their contention that contract work is undertaken without profit, three fittings contracts recently obtained by the department. They complained that an arrangement made with the Committee by a deputation from the gas-fittings trade in 1877, to prevent unjust competition, had not been carried out, and alleged that this arrangement was that a discount of 50 per cent. should be allowed from the list prices of iron tubes and fittings on all work, whatever the trade discount might be. They stated that under this arrangement they should not have complained of competition. It appears, therefore, to your Committee that the questions which the Council are invited to consider are—(1) whether the Fittings Department shall be discontinued on the broad question of principle; and (2) whether it has been carried on in a manner to inflict hardship on, or to ruin, private traders."

On the question of principle, the Committee remind the Council that the subject of the Fittings Department, and its development, has been frequently brought under their notice in the reports of the Committee, and that on three previous occasions the Council have directly approved the principle involved—namely, in 1875, when the purchase was made from the Companies; in 1877, when the matter was before them on the agitation of private traders; and again in 1883, when, at the time of the consideration of the Consolidation Bill, the clauses which would have placed the department in a better position than the private fitters—viz., the powers to manufacture gas-fittings, and to distrain for fitting accounts in arrear, were omitted by the Council from the Bill. It has also twice been approved by Parliament, when the Act for the purchase of the undertaking and the Consolidation Act were passed; and, in the latter case, after a petition against its continuance had been presented and discussed in the Committee of the House of Commons on the Bill. Nor is the position of the Corporation exceptional in this respect. Inquiries have been made of the corporations owning gas undertakings and the gas companies in the Midlands, and also of all the principal of such corporations and gas companies throughout the kingdom; and your Committee find that there is only one of them which has not parliamentary powers to supply fittings. Of fifty-five of these corporations, only seven do not either supply or fix fittings. Twenty-eight of them do fittings work; and of these sixteen do more or less of it at cost price or without charge—the remaining twenty sell or hire fittings or stoves, or both, without doing fittings work. Of twenty-six of such gas companies, only three neither deal in nor fix fittings; twenty do fittings work; and of these thirteen do portions of this work either free or at cost price—the remaining three sell or hire fittings or stoves, or both. It is not difficult to see why Parliament should have so generally conferred, and gas undertakers have so generally used, the powers to supply and fix fittings. The interests of the manufacturers and suppliers of gas are inseparable from its efficient use. With the increasing severity of the competition to which gas, whether as an illuminant or for heating purposes, is now becoming subject, it is more than ever the duty of the Council, in the interests of the ratepayers who have invested so large a capital in the undertaking, to make every effort not only to popularize, and extend in new directions, the use of gas, but to demonstrate that it can be as economically and efficiently used as its competitors. There can now be no doubt whatever that the future of gas largely depends on the use of high-power burners—regenerative or other; and on its application to heating purposes. It is, therefore, of vital importance to the interests of the Council as gas undertakers that full and immediate advantage should be taken of modern improvements, and that there shall be a show-room, easily accessible to consumers, where the most efficient and economical gas apparatus of every kind can be seen, in the charge of attendants who know the capabilites of gas, and who are able to demonstrate the importance of such improvements. It is pointed out that the greatest enemy to the true interests of the gas supplier is the use of appliances which can only lead to disappointment or extravagance. The object of each private trader is naturally to sell his own production; while the object of the department is to sell the apparatus which has been ascertained, after careful trial, to be that which will produce a satisfactory result without requiring an extravagant use of gas, and which is frequently the most costly in the initial outlay, and, therefore, by far the most difficult to sell. It was only by the establishment of the Corporation show-room that modern gas apparatus was introduced to the notice of gas consumers in the city. The use of gas cooking-stoves, it is stated, was practically created by means of the exhibition of gas apparatus held in the Town Hall in 1878; but the use of such stoves in Birmingham is insignificant as compared with some other large towns. The number of such stoves sold and hired by the Committee in 1888 was 205; and their retail value £1000. The profit on these stoves, if all of them had been sold outright in equal proportions by the memorialists, would have yielded to each of them a profit of about £4 15s.

With regard to the fixing of gas-fittings, the Committee say: "Numbers of complaints received from the gas consumers, and dealt with by the Fittings Department, are due either to bad lighting arising from the use of insufficient or defective fittings and burners, or to the extravagant use of gas arising from inefficient, wasteful, or cheaply fixed fittings or apparatus. In every case of complaint of defective light in which the consumer has given the department full power to examine and rectify fittings, the remedy has been satisfactory as far as your Committee are aware; whereas if the Fittings Department were discontinued, the Committee would be powerless to show that the fault lay with the fittings and not with the gas. In recent years, owing to the depression of trade, and to the introduction of high-power burners, the demand for gas has not increased in the normal ratio. But the growing use of gas-fires, which, when properly fixed and maintained, are undoubtedly economical for occasional use, has contributed to a considerable extent to the maintenance of the demand. No part of the fittings work requires greater care; and a consumer frequently abandons the use of gas in this direction, attributing his failure to a wrong application of gas, and not to its real cause. So well is this understood, that the fixing of gas fires is only entrusted by the Fittings Department to the best of the fitters in its employment, who have been especially trained to the work. The use of many gas-heating stoves and hot-water heaters has been abandoned for similar reasons, which, had the necessary expenditure been incurred in properly fixing them in the first place, and especially with due regard to provision for carrying away the products of combustion, would now be giving satisfaction to the consumer and largely contributing to the consumption of gas. Similarly, when a building has been too cheaply fitted, as the result of extreme competition, it is very difficult, and occasionally impossible, to convince consumers that the fault is not either due to the quality of the gas, or to deficient pressure in the mains. The importance of this matter was so soon impressed on the Gas Committee, that in 1878 they issued to consumers particulars of efficient fittings required for varying supplies, with a statement of the object and policy of the Fittings Department, and an offer to architects to prepare or revise specifications for gas-fittings for new or altered buildings, giving a pledge not to apply for such fittings work, or for permission to tender for it, in connection with such services."

With regard to the allegation that the department is carred on in an unjust and oppressive manner, or to the ruin of other traders, the deputation from the Gas-Fitters' Committee limited these allegations to contract work, and expressly state that they did not object to the charges for day work carried on by the department. The Committee report that the number of fittings accounts charged in the books of the Corporation in 1888, including the accounts for fixing meters, was 16,165. The value of these accounts was as follows:—Under £1, 13,200; over £1 and under £5, 2400; over £5 and under £20, 475; over £20, 90—total 16,165. The turnover in the department in that year was £20,000, of which £1600 represented contract work. The following table gives the number of estimates dealt with in the Fittings Department in the three years ended December 31 last:—

—	Number of Estimates given by the Department.			Number accepted.			Number declined.		
Year	Over £50.	Under £50.	Total.	Over £50.	Under £50.	Total.	Over £50.	Under £50	Total.
1886 .	2 ..	374 ..	376	1 ..	174 ..	175	1 ..	200 ..	201
1887 .	8 ..	439 ..	447	4 ..	183 ..	188	4 ..	257 ..	261
1888 .	11 ..	431 ..	442	4 ..	177 ..	181	7 ..	254 ..	261
Total .	21 ..	1244 ..	1265	9 ..	533 ..	542	12 ..	711 ..	723

This table affords conclusive evidence that the department does not undersell the trade upon contract work; while it also completely answers the allegation of the deputation that the Corporation monopolize the bulk of the trade. As to the statement of the deputation that they were satisfied with the state of things in the time of the Companies, that the competition is becoming worse year by year, and that private fitters are being driven out of the trade, the Committee report that the average annual turnover in the Fittings Department of the Gas Companies in 1873 and 1874 (their two last complete years of trading) was £24,500. But in connection with this turnover, it must, they say, be remembered that the rival Companies, desiring to obtain the gas supply of an important new building, undertook the fittings work in such buildings at cost price, or even without charge. The average annual turnover in the years 1887 and 1888 was £20,300. A tabular statement is next given of the turnover each year since the transfer of the undertakings. In 1876, it was £24,320. It has never reached that figure since; and in 1888 it was £19,976. In 1888 the total was made up as follows:—Labour, £6575; iron, lead, composition, and brass tubes and fittings, £2865; lighting apparatus, £3415; heating ditto, £490; general fittings, £4245; work charged in connection with mains and services but done by contractors, £2385. It has also been ascertained by reference to a Birmingham Directory for 1872 that the names of 65 gas-fitters are therein given as trading in Birmingham. In the Post Office Directory for Birmingham for 1888, the names of 83 are given. The Committee believe that these figures "will convince the Council that so far from the position of the private traders being worse now than it was under the Companies, when, as they acknowledge, they had no cause of complaint, it is, as regards competition, distinctly better, and that any loss of trade which they may have experienced has not been due to the competition of the Fittings Department, but to the depression of trade or general causes also adversely affecting that department, as shown by the foregoing returns." The Committee add that they have always most carefully watched the operations of the Fittings Department with a view to prevent any action of which private fitters could fairly complain.

The report proceeds to state that the department has a fixed price for its work, based on fair charges for best work, which is charged alike to all consumers in like circumstances. Its scale of profit is a fair one both to the consumers and to competing fitters. It refuses to estimate upon specifications which do not provide for sufficient and good fittings, and unless it is satisfied that the work when completed will not lead to complaints from the consumers. The large number of its tenders which are rejected is due to a great extent to its estimating for more efficient work than that asked for, and to its rule always to tender at a fixed price. For the fitting of some of the most important buildings in Birmingham, including some of the Corporation buildings, it has been called upon to compete with London gas-fitters alone; and as regards many of them, where a special method of lighting was required, it has refused to compete. Of the forty-three Board schools in Birmingham, the department has fitted or partially fitted twenty-seven; for the remaining sixteen, its tenders have been refused. Of those built before the transfer of the undertakings, a

larger proportion were fitted by the Companies than the Corporation have fitted of those built since that date. As to the alleged promise that a fixed discount of 50 per cent. should be allowed by the Corporation on iron tubes and fittings, the Committee find no mention of any such arrangement in the shorthand-writer's notes of the interview between the fitters' representatives and the Committee in 1877. They believe that the deputation has been misinformed. With regard to three specific contracts quoted by the deputation in support of their contention that contract work is undertaken without profit, an examination of the books does not support this allegation. Two of them, including the largest, yielded something over the ordinary profit. The average annual profit on the Fittings Department since the transfer, as shown in the published accounts, has been £1820, on a capital (varying with the turnover) from £10,000 to £12,000; the department being at the same time burdened with heavy standing charges for rent, and for the clerical staff required to adapt its book-keeping to the requirements of the gas-rental accounts. If this is a ratepayers' question, it is one which the whole of the ratepayers, and not a small section of them, should decide. The memorial addressed to the Council is signed by 44 ratepayers; but by none of the principal manufacturers of gas-fittings in the city. Out of 79 manufacturers of gas apparatus whose names appear in the Birmingham Directory for 1888, the memorial is signed by 6; and out of 83 gas-fitters whose names so appear, it is signed by 22. It is also signed by 16 gas-fitters whose names do not appear in the Directory. There are, therefore, at least 134 manufacturers of gas apparatus and gas-fitters in the city who have taken no part in the memorial. On the other hand, the Committee have received a memorial, signed by 55 of the fitters in their employment, asking, as ratepayers, that the department may be continued, both as regards the interests of the 127 workmen who are employed in it, and in the interests of the efficiency of the trade. There are also the interests and convenience to be considered of the 13,000 consumers who in 1888, having found some defect in their fittings, or who, requiring some small fittings work done, were enabled, by sending a message to the Gas Offices, to receive, without delay, attention to their requirements, and had no further trouble in the matter. If the Fittings Department is regarded as an injustice by any considerable section of the ratepayers, they have the matter in their own hands. The manufacturers whose goods are now exhibited in the show-rooms by withdrawing those goods would compel the Corporation to close it, as they would thereby defeat the object of showing there only the best apparatus to be obtained; while the 16,000 consumers who employed the department last year could, by sending their orders to private traders, have closed the operative part of it.

The Reply of the Gas-Fitters' Committee.

The Gas-Fitters' Committee have not been slow in preparing their reply to the foregoing report; and copies were circulated among the members of the City Council last Friday. It is as follows:—

We wish at the outset to point out that we are raising in this controversy the cardinal point of principle, as to whether it is morally right and just that a Corporation should enter into trading competition with its ratepayers; or, to put it in another way, whether it is just that ratepayers should be compelled by an arbitrary law to subscribe capital to a rival concern which enters into keen and crushing competition with themselves. As a legal right, we admit at once that the Corporation obtained all powers under the Consolidation Act, and will further admit that so far as we were in a position to affect the matter, they might have obtained any arbitrary clause they thought proper to insert; for it would indeed be an absurd contention that any section of traders would successfully oppose a wealthy and powerful Corporation. As we expected, this Act forms one of the principal arguments in their defence; and we are at once willing to concede all they contend in this respect, for what it is worth. But for further argument in justification of the principle, we have curiously searched the report, and can safely leave the issue in this respect in the hands of the Council without any remarks of our own. As a matter of fact, we, however, cannot see that any attempt to justify the principle is made.

Now we come to the two heads under which an attempt to justify the continuance of the department is made—viz., public interest and convenience. The argument of "public interest" either casts the very grave reflection of incapacity and incompetence upon the gas-fitting trade in Birmingham generally, or assumes that the financial results are so brilliant that their loss would be a disaster to the public. Of this latter we shall be able to treat when we come to the financial question a little later on. On the former point we would ask by what right the Corporation Gas-Fitting Department arrogates to itself all the efficiency and all the capacity of the trade. It is a presumption unjustifiable, and insulting to private gas-fitters. We respectfully submit that, although the Corporation grabs a considerable portion of the trade of the City, yet the other portion is done by private firms to the satisfaction of their customers; and we do not think they dare to assert openly that our work is done incompetently. If it is so beneficial and expedient to the public interest that the Corporation should have any control of the retail sale and fixing of gas-fittings, we think a clause should have been inserted in the Consolidation Act giving them a monopoly of the trade and power to close our shops.

It appears to us very remarkable that the Birmingham Corporation, of all towns in the kingdom where competent gas-fitters ought to be found, should be alone in discovering that the gas-fitters of their city are an incompetent, incapable, and disobliging set of tradesmen. All other towns or cities of importance in the kingdom are quite content to entrust the work to the hands of private traders, and do not encourage or permit a rate-aided competition. . . . . We admit neither superior workmanship nor ability to the Corporation Gas Department, and are prepared to compete with the same staff of officials and workmen, *minus* ratepayers' capital and Corporation patronage.

The argument of public convenience would assume that gas-fitters carry on business in a very different way to the majority of shopkeepers in this town, and are ignorant of its elementary principles. We shall be glad to hear what they think we are in business for, unless it is to suit the convenience of the public and supply its wants and demands. We cannot think that they really advance this as a serious argument.

The Committee also assert that they do not enter into unfair competition with the traders, and deny that they operate unfairly against them; but we would beg to remind them that we are asking no favours, but firmly advocating our rights. If the department is still permitted to continue, the injustice still remains; and they continue to be the same competitive rivals, supported by ratepayers' capital and under Corporation patronage; and the officials responsible will do all in their power to hold their positions by making the department show as much profit as possible just in the same manner as any other trading concern, irrespective of the feelings or interests of private traders. If this is not so, why do they prepare and give estimates? Does anyone suppose they do it for fun? Does it stand to common sense that when they prepare estimates they designedly fix a price so high that the trade can step in and secure the work! They work to win, and secure as much work as they can, and at the best prices they can, and make their high prices out of customers who are willing to let them charge what they like.

Now, when we come to look at the matter from a financial point of view, one would think that with all the advantages of claimed superior workmanship, capacity, corporation patronage, &c., the result would have been a grand success, whereas, we contend, so signal a failure has it been that this in itself should be sufficient to condemn it. We will take the figures as given to us by the Secretary of the Gas Department, which are as follows:—1883 profit, £2366; 1884 profit, £1336; 1885 profit, £928; 1886 profit, £964; 1887 loss, £249; and 1888 profit, £1121. From this we gather that the average profit for the past six years is £1119 per annum, and the average for the last three years, £595! In 1887 a loss of £249 was made; and we ask, what right for existence has an unnecessary department, which actually makes a loss on one year's tradings and cannot gaurantee itself against a similar catastrophe for any of its year's tradings? Is this to the public interest? This is our analysis from the figures as they make them; but we would like to know how they are arrived at. The following are a series of questions we asked of the Sub-Committee, but were refused, and told that, on the publication of their report, we should be able to obtain the information asked for. The report is now published; and we leave it to the public to judge how far they have fulfilled their promise. (1) Complete turnover for each year, 1883 to 1888 inclusive; (2) Number of officers and men employed; (3) Amount paid in salaries and wages (not individually) each year as above; (4) Rent (separate) and rates and taxes paid each year as above; (5) What proportion (if any) of the expenses of the secretarial and accountancy staff is chargeable to the department; (6) Total expenditure of the department each year as above; (7) Capital employed (approximate); (8) Amount of insurance premiums. And in addition to above, we would like to know if interest on capital is calculated. Is this result sufficiently brilliant to justify the department as a commercial enterprise?

We quite admit and approve that the gas undertaking should be in the hands of the Corporation so far as the manufacture and supply of gas and the control of the mains; but we consider that the system of estimating and contracting for the supply and fixing of pipes and fittings for the interior of buildings is an infringement of our rights and a great injustice, which is incapable of justification, either as a matter of principle or as a matter of public benefit, expediency, or convenience.

The report admits that 27 out of 55 large and small corporations do not engage in the fittings work, but omit to state, out of the remaining 28, to what extent they do engage, and how many keep a large show-room for the specific purpose of carrying on the gas-fitting trade in all its generalities and details. We deal with important towns, and grant one only, Leicester, where the outcry is just as bitter. In towns where the undertaking is in the hands of a private company, we admit they have a right to do whatever they think proper, and please themselves. They trade with private capital and without corporation patronage and prestige.

London, the first city in the world, can find gas-fitters to carry on their businesses satisfactorily. Manchester grants licences to the private fitters to fix meters even. Liverpool is a private undertaking. Leeds and Bradford do not adopt such a system. Glasgow refuses to sanction rate-aided competition, and with the exception of Leicester, "Birmingham stands alone;" and even the Birmingham Gas Department which so proudly boasts that it must stand between the public and the avaricious and incompetent private gas-fitter, absolutely places all the work of connecting the services in the hands of a private company, Messrs. Aird and Sons, London.

WEST BROMWICH CORPORATION GAS SUPPLY.

The Progress of the Gas Undertaking.

The Secretary of the West Bromwich Corporation Gas Department (Mr. T. Hudson) has just presented to the Gas Committee his report on the working of the undertaking in the twelve months ending the 25th of March last. We learn therefrom that the loan indebtedness at the close of the financial year was £143,909 17s. 10d.; and there is a balance of £1911 1s. 3d. to be re-borrowed to replace instalments of loans paid during the year, which will make a total indebtedness of £145,820 19s. 1d., or £7 18s. 5d. per ton of coal carbonized. During the year a sum of £1000 of the loan capital was paid off through the operations of the sinking fund account, which brings the total of loans thus discharged to £8800. The amount expended on capital account during the year in additions to the manufacturing and distributory plant was £392 3s. 5d.; and deducting therefrom the sum of £128 16s. 2d., which is transferred to the revenue account, the total capital outlay down to the 25th of March last is brought to £157,675 2s. 9d., or £8 11s. 3·52d. per ton of coal carbonized. The amount of capital expended per ton of coal carbonized is somewhat high when compared with many gas undertakings; and Mr. Hudson says this fact should be borne in mind by the Committee when making comparisons with the results obtained by other gas-works.

Mr. Hudson thinks the result of the year's trading may be considered as fairly satisfactory. The receipts from the sales of gas show an increase of 2·11 per cent. over the preceding year; and the receipts from coke and tar, as well as those from gas-fittings and stoves, likewise show an advance. The income derived from the sale of gas to private consumers and by public lighting was £471 8s. 5d. in excess of the preceding year, owing to an increased consumption of gas. The receipts from coke also show an improvement of £361 17s. 5d., and tar of £52 9s. 2d.—in both cases owing to the realization of better prices during the year. The receipts from ammoniacal liquor, however, show a decrease of £31 15s. 7d., partly due to a decreased yield per ton, and partly to the fact of lower prices obtaining in the sulphate of ammonia market. The total receipts from residual products were £6461 16s. 1d., as against £6085 19s. 6d. for the preceding year—an increase of £375 17s. 5d. The revenue from gas-fittings and stoves was £1360 12s.—an increase of £234 19s. 5d. The receipts from all sources, after deducting miscellaneous items, amounted to £30,677 10s. 9d., as compared with £29,595 5s. 6d. in the previous year; being an increase of £1082 5s. 3d.

The total expenditure for the year was £21,638 13s. 8d., as compared with £20,975 17s. 9d. in the previous year—an increase of £662 15s. 11d. The cost of manufacture was £14,241, as against £13,793 2s. 6d.—an increase of £447 17s. 6d. The cost is equivalent to 15s. 5·66d. per ton of coal carbonized, as compared with 15s. 1·63d. in the previous year—an increase of 4·03d. per ton. The net cost of coals for gas making purposes was £8722 18s. 9d., as compared with £8564 18s. 6d.—an increase of £158 0s. 3d. Although the expenditure under this head shows an increase, the quantity of gas made during the year was below that of the previous year; proving that the yield of gas per ton of coal carbonized was not so high as in the preceding year. The total cost of coal was £8904 11s. 10d., as against £8759 3s. 7d.—an increase of £145 8s. 3d.; and when worked out per ton of coal this comes to 9s. 8·08d., as against 9s. 7·34d. The net cost of fuel for firing purposes was £995 17s. 5d., as against £832 14s. 5d.—an increase of £163 3s., and the total cost, including tonnage, haulage, &c., £1193 4s. 10d., as against £1037 3s. 2d., or an increase of £156 1s. 8d.,

largely due to the increased price paid for slack since October last. The cost of purifying was £61 3s. 4d. below that for the preceding year—a saving per ton of coal carbonized, after allowing for the decreased volume of gas to be purified. The wages at the works also show a decrease of £14 8s. 10d.; and sundry manufacturing charges an increase of £166 2s. 11d. The cost of repairs, maintenance, and renewals of plant was £1295 2s. 11d., as compared with £1239 6s. 1d.—an increase of £55 16s. 10d.

The cost of distribution was £1585 19s. 5d., as against £1350 8s. 1d.—an increase of £235 11s. 4d. When worked out upon the quantity of gas sold, this comes to 2·12d., as against 1·84d. per 1000 cubic feet. Mr. Hudson explains that the increased expenditure in this department is due to the fact that greater diligence has been exercised in discovering and repairing fractures in mains, which has resulted in a saving from loss of gas as compared with the preceding year. The expenses of cleaning, lighting, and repairing the public lamps of the borough amounted to £552 8s.—a decrease of £9 17s. 7d., although the number of lamps was slightly increased during the year. The payments on account of rents, rates, and taxes amounted to £1596 2s. 7d., as compared with £1397 4s. 8d.—an increase of £198 17s. 11d. The cause of this is the higher rates levied throughout the borough during the year. In the management charges there was little variation, except in the item of bank charges. Deducting this item from both years, we obtain an expenditure of £982 16s. 3d., as against £965 4s. 5d.—an increase of £17 11s. 10d. The bank charges diminished by £145 3s. 6d.; law and professional charges decreased £19 2s. 6d.; and bad debts were reduced from £15 16s. 9d. in 1887-8 to £7 9s. 2d. in the past year. The expenditure in the gas-fitting and stoves department was £1198 19s. 11d., as against £1091 19s. 3d.—an increase of £107 0s. 8d., due to more business.

The revenue account shows a balance of income over expenditure of £9127 9s. 11d., which is carried to the profit and loss account; being an increase of £420 8s. 2d. over the preceding year. The instalment to the sinking fund for redemption of loans was £901 7s. 9d.; and the interest paid to the same fund in respect of the amounts applied in redemption was £71 3s. 6d. This with the interest paid and accrued on ordinary loans amounting to £5961 1s. 6d. produced a total for interest and instalment of £6933 12s. 9d.; leaving a balance or surplus to be carried forward of £2193 17s. 2d.—an increase of £403 0s. 2d. over the previous year. The balance of accumulated profits now standing to the credit of the profit and loss account will thereby be £7017 15s. 9d.

The quantity of coal and cannel carbonized during the year was 18,410 tons—an increase of 184 tons. The quantity of gas made therefrom was 188,713,000 cubic feet—a decrease of 4,394,000 cubic feet. The amount of gas sold was 179,127,100 cubic feet—an increase of 3,442,900 cubic feet; being 95 per cent. of the total sent from the works. The quantity of gas lost by leakage and condensation was 7,605,900 cubic feet, or 4·04 per cent., as compared with 7·80 per cent. in the previous year. The number of meters in use at the end of the year was 5068, as compared with 4984 in 1887-8—an increase of 84. The length of new mains laid was 3 furlongs 111 yards.

Mr. Hudson concludes his report by expressing a hope that the business of the undertaking during the year was performed in a manner to meet with the Committee's approbation.

Among the tabulated statistics accompanying the report is the following analysis of the items in the revenue account:—

	£ s. d.	£ s. d.	Per Ton of Coal Carbonized. s. d.	s. d.	Per 1000 cub. ft. of Gas Sold. s. d.	s. d.
Manufacture—						
Coal for carbonizing	8,904 11 10		9 8·08		0 11·94	
Coal for firing	1,193 4 10		1 3·56		0 1·59	
Purification	281 12 9		0 3·65		0 0·37	
Manager's salary	275 0 0		0 3·59		0 0·36	
Wages at works	1,889 11 7		2 0·65		0 2·54	
Repairs of works, &c.	1,295 2 11		1 4·89		0 1·74	
Sundries	401 16 1		0 5·24		0 0·54	
		14,241 0 0		15 5·66		1 7·08
Distribution—						
Salaries and wages	355 12 9		0 4·63		0 0·47	
Repairs—mains, services	821 0 8		0 10·71		0 1·11	
meters	409 6 0		0 5·33		0 0·54	
		1,585 19 5		1 8·67		0 2·12
Public lamps	—	552 8 0		0 7·20		0 0·74
Rents, rates, and taxes	—	1,596 2 7		1 8·80		0 2·13
Management—						
Salaries	528 11 0		0 6·89		0 0·70	
Collection	130 3 7		0 1·56		0 0·16	
Printing and stationery	98 4 1		0 1·28		0 0·13	
General establishment charges	204 7 7		0 2·66		0 0·28	
Bank interest, &c.	312 19 6		0 4·09		0 0·41	
Auditor	31 10 0		0 0·41		0 0·04	
		1,295 15 9		1 4·89		0 1·73
Law charges and negotiation of loans	11 5 0		0 0·15		0 0·01	
Bad debts	7 9 2		0 0·09		0 0·01	
Discounts and abatements	1,149 13 10		1 2·99		0 1·55	
		1,168 8 0		1 2·99		0 1·57
Total cost of gas		20,439 13 9		22 2·45		2 3·37
Less residuals—						
Coke and breeze (less labour)	4,347 5 3		4 8·67		0 5·83	
Tar	984 6 8		1 0·83		0 1·31	
Ammoniacal liquor	1,072 4 9		1 1·98		0 1·44	
Sundries	58 0 3		0 0·76		0 0·08	
		6,461 16 11		7 0·24		0 8·66
		13,977 16 10		15 2·21		1 6·71
Less profit on fittings and stoves	161 12 1		—		—	
Miscellaneous receipts	88 12 10		—		—	
		250 4 11	—	0 3·26	—	0 0·34
Net cost of gas	—	13,727 11 11	—	14 10·95	—	1 6·37
Balance — representing gross profit	—	9,127 9 11	—	9 10·98	—	1 0·23
Revenue from sales of gas	—	22,855 1 10	—	24 9·96	—	2 6·60
Interest on loans	—	6,032 5 0	—	6 6·61	—	0 8·08
Sinking fund for redemption of loans	—	901 7 9	—	0 11·75	—	0 1·21
Net profit after payment of interest	—	2,193 17 2	—	2 4·60	—	0 2·94
Capital expended	—	157,679 2 9	—	171 3·52	—	17 7·26

INCREASED STORAGE AT WHITEHAVEN GAS-WORKS.—A new holder is being erected at the Whitehaven Gas-Works, the contract for which is being carried out by Messrs. R. and J. Dempster, of Manchester.

TIPTON LOCAL BOARD GAS SUPPLY.

The accounts of the Tipton Local Board Gas Department for the year ending March 25 last exhibit an all-round improvement as compared with the previous twelve months. The net amount received for gas was £8341, against £7954. The residual products yielded a sum of £2762, in comparison with £2284. The gross receipts were £11,344; and £10,434 in 1887-8. The expenditure for the manufacture of gas amounted to £5836, as against £5400; distribution cost £384, compared with £386; and the total outlay was £7311, against £6952. The gross profit was £4032; and in 1887-8, £3482. After payment of interest on mortgages (£2719), and a sum of £583 to the sinking fund for redemption of loans, and deducting £18 10s. 11d. for bad debts, the net profit for the past year amounted to £641. The following is the working statement of the Gas Engineer and Manager (Mr. Vincent Hughes) for the past two years:—

	Year ended March 25, 1889.	Year ended March 25, 1889.
Coal and cannel carbonized (per ton of 20 cwt.)	7,411 tons.	7,022 tons.
Gas made	78,884,000 cub. ft.	73,353,000 cub. ft.
Make of gas per ton of 20 cwt.	10,644 "	10,446 "
Gas sent out from the works	78,902,931 "	73,365,508 "
Gas sold and used at the works	71,412,756 "	66,810,915 "
Leakage, condensation, &c.	7,490,165	6,554,593
	or 9·49 pr. ct.	or 8·93 pr. ct.
Average illuminating power	17·66 candles	17·59 candles.

OLDHAM CORPORATION GAS SUPPLY.

THE ANNUAL REPORT.

The statement of accounts and the usual statistical tables relating to the Oldham Corporation gas undertaking for the year ending the 25th of March last were presented to the Gas Committee on the 22nd ult. The expenditure on capital account during the year was £3075 2s. 7d. The gross revenue for the year was £106,318 18s. 10d.; and the gross expenditure, £78,244 7s. 2d.—leaving a balance of £28,074 11s. 8d. to carry to the profit and loss account. Out of this balance the annuities to be paid are £3590 11s. 8d.; the interest on loans and stock is £7015 3s. 1d.; the sums payable to the sinking fund amount to £4373; and the total profit which can be placed to the borough fund is £7380 11s. 7d. After paying these charges, there remains a surplus of £5715 5s. 4d., which can either be transferred to the reserve fund or carried forward to the current year's accounts. Prior to the passing of the Act of 1886, the sums paid in aid of the borough rates from the gas profits amounted to £232,948 7s. 4d., ranging over a period of 20 years; the yearly average being £11,647 8s. 4d. Since the passing of the Act, gas has been supplied to the street lamps and municipal buildings free of cost. Before this it was charged and paid for out of the borough fund. The benefit to the fund from the gas thus supplied during the past year is £5834 17s. 11d. Adding this to the amount of the gas profit to be paid over, there is a total of £13,251 9s. 6d. as the amount of benefit derived from the gas undertaking by the borough fund for the year. The price of gas was reduced 2d. per 1000 cubic feet from the 25th of March, and during the year the price and the discount allowed therefrom have been as follows, within the district of supply:—When the quarterly consumption is under 2,000,000 cubic feet, the price is 2s. 6d., discount 6d.; 2,000,000 cubic feet and under 5,000,000 cubic feet, price 2s. 9d., discount 6d.; 5,000,000 cubic feet and upwards, price 2s. 10·1., discount 6d. Beyond the limits of supply: 3s. 4d. per 1000 feet net. The quantity of gas manufactured at the different stations during the year was as follows:—Oldham, 163,343,000 cubic feet; Higginshaw, 323,212,000; Hollinwood, 305,168,000; and Royton, 45,791,000—total, 837,514,000 feet, as against 809,527,000 feet in the preceding year. The average quantity of gas made per ton of cannel and coal carbonized was 10,267 cubic feet. The loss from leakage, &c., was 46,256,000 cubic feet, or 5·522 per cent. of the make. The maximum quantity of gas delivered in 24 hours was on Dec. 28, 1888—5,277,000 cubic feet, as compared with 5,238,000 cubic feet last year. The minimum quantity of gas delivered in 24 hours was on the 24th of June—523,000 cubic feet, as against 527,000 cubic feet in the previous year. The average illuminating power was equal to 20·07 candles. During the year 786 new meters were fixed, and 774 consumers added. The total number of meters now in use is 42,578; and the number of consumers is 41,852. The length of gas mains laid in extensions, enlargements, and renewals during the year was 4820 yards; and mains taken up, 2740 yards.

GRAND JUNCTION WATER-WORKS COMPANY.—The report of this Company for the half year ending the 31st of March last states that the Directors recommend a dividend at the rate of 9 per cent. on the ordinary share capital, of 7½ per cent. on the £25 "C" shares, and of 7 per cent. per annum on the new ordinary £50 shares.

LIVERSEDGE WATER SUPPLY.—At a meeting of the Liversedge Local Board last Tuesday, a letter was read from the Gomersal Water Company, enclosing a copy of the following resolution recently adopted by them:—"That in consequence of complaints of deficient water supply to the higher parts of Liversedge district, an offer be made to the Liversedge Local Board to lay a 6-inch water main from Hilltop, Gomersal, to the boundary of the Gomersal township, to supply Liversedge, on condition that the Liversedge Local Board will agree to receive the whole of their water throughout the whole of their district from this Company's mains for a period of not less than ten years, at a price in all cases of 1½d. per 1000 gallons more than will be charged for the water by the Bradford Corporation to this Company." Under present arrangements the township of Liversedge is supplied partly through Cleckheaton. The letter was referred to the Water-Works Committee for consideration.

THE ELECTRIC LIGHTING SCHEME FOR BIRMINGHAM.—It is reported that the negotiations between the General Purposes Committee of the Birmingham Corporation and Messrs. Chamberlain and Hookham have practically terminated, and that the issue of the Provisional Order promoted by the latter may be considered a certainty. The final form of the Order, as settled by the promoters in consultation with the Board of Trade and the Public Works Committee, limits the Order to a restricted area of the city, composed principally of Market Hall Ward. The promoters will be required to form a Company with a capital of £50,000. There were till within the last few days some differences between the Committee and the promoters with regard to certain of the details; but these have mainly been arranged. With regard to objections made to clauses in their own and in the London and other Provisional Orders, the promoters say that they will accept the general ruling of the Board of Trade. They are prepared to proceed with the formation of a Company as soon as the confirmation of the Order takes place, and (says a local contemporary) it is confidently expected that Birmingham, as far as the central area is concerned, will be before London in the possession of facilities for electric lighting. It may be added that Messrs. Chamberlain and Hookham have served on the Council, as the local authority, the notice necessary to enable them to apply for a further Provisional Order next session, to include the whole of the municipal area.

NOTES FROM SCOTLAND.

(FROM OUR EDINBURGH CORRESPONDENT.)

EDINBURGH, *Saturday.*

The Edinburgh and Leith Gas Commissioners sat for fifteen minutes on Monday, and transacted the following items of business:—On the recommendation of the Works Committee, it was resolved that no reduction be given to the Leith Dock Commission in the charge for lighting the Shore of Leith. The Dock Commissioners, the Committee stated, pay no municipal taxes; and besides they receive an extra large discount on their gas account. The Commission approved of tenders from 22 collieries for the supply of coal to the Edinburgh works for the ensuing year; the total estimated quantity being 68,500 tons, for £40,616 13s. 4d., which is at the rate of 11s. 10½d. per ton. They also approved of tenders from 16 collieries for the supply of 38,500 tons of coal for the Leith works, at the total price of £24,072 18s. 4d., or 12s. 8d. per ton. It was reported that the output of gas from the Edinburgh works during the month of April was 56,040,000 feet, as compared with 51,617,000 feet in April, 1888; and that at the Leith works the output was 25,673,000 feet, as compared with 25,034,000 feet in the preceding year. The trade accounts for the past month were reported to have amounted to £7567 13s. The Finance Committee reported that the Joint Committee of the Corporations had asked the Commissioners to pay £1000 into the fee funds of the Town Clerks of Edinburgh and Leith for their services in connection with the Corporation's Bill last year; that Mr. Skinner, Edinburgh, claimed £750 of that sum, and also £360 11s. 8d. for his trouble in opposing the Edinburgh Gas Company's Bill of 1887; that Bailie Archibald, of Leith, objected to the proposed method of division; and that a Committee had been appointed to see Mr. Skinner on the subject. The Clerk, Mr. Jack, read a letter from the Arniston Coal Company, stating that they had for years supplied the Leith works with great seam parrot coal; and if the price was the reason for their offer being rejected this year, they would offer it at 1s. per ton less than their tender rather than look for a new customer. A letter from Mr. Linton, the Engineer at Leith, was also read, stating that at 9s. per ton the Arniston coal was cheap; and he thought he could find room for it. A minute of a meeting held in private on May 7 was submitted, which stated that leakage still existed at the new gasholder tank at Meadowflat, beside Messrs. Wm. Younger and Co.'s brewery; and that the Commissioners had ordered the tank to be emptied as soon as possible, and to be thoroughly tested and made water-tight by Mr. G. M. Cunningham, Mr. W. Foulis, Mr. R. Mitchell, and Mr. F. T. C. Linton, under the authority of the Works Committee, who were granted full powers in the matter. A minute of a previous meeting of the Law Committee stated that Messrs. Younger had made a claim for 10 million gallons of water a year; that Mr. Mitchell had given it as his opinion that it would be useless to sink another well in the brewery, because it would require to be very deep, and would be sure to intercept the strata by which it was supposed contamination was introduced into the old well; and that he strongly recommended, if practicable, that water should be obtained from a distance, and supplied to Messrs. Younger.

Mr. Nicoll, the Treasurer of the Dundee Gas Commissioners, at a meeting of the Finance Committee on Tuesday, reported that the revenue of the Commissioners for the year was £73,154 7s. 5d., and the expenditure £71,884 8s. 4d.; leaving a surplus of £1270 9s. 1d. These figures, he submitted, fully bore out what was expected when the estimates were prepared; and showed that their works were in a thriving condition. Taking into account the prosperous state of their affairs, and the fact that they were likely to sell an increased quantity of gas during the current year, he was prepared to move that the price of gas be reduced 2d. per 1000 cubic feet—from 3s. 8d. to 3s. 6d.—which was as low as gas had ever been sold in Dundee. During this year he expected they would require to manufacture an additional 14,000,000 cubic feet of gas in their works. It was resolved to recommend that the reduction be made. Twenty years ago the price of gas in Dundee was 5s. 4d. per 1000 cubic feet; and since then the quantity of gas produced has been quadrupled. In the year preceding the one just closed, the revenue was £73,671 19s. 3d., which was an increase on the previous year of £2454 17s. 8d. The income for the past year was estimated at £71,079 15s. 2d.; and the expenditure at £70,986 12s. 8d. The expenditure, however, was calculated to meet an increased consumption of 5 million cubic feet, whereas it has been about 20 millions.

Sheriff Comrie Thomson held an inquiry at Broughty Ferry, on Saturday last, relative to a petition by the Police Commissioners for the extension of the burgh boundaries, at which Mr. Littlejohn, Clerk to the Commissioners, made a statement, in which he said: "The supply of water in Broughty Ferry is from the same sources as Dundee. The burgh is embraced within the boundaries of the Dundee Water Acts. The supply of gas is from works within the burgh, vested by Act of Parliament in the Police Commissioners. They already supply gas to the Barnhill district, charging consumers 10d. extra per 1000 cubic feet. The public lamps in that district are very indifferently lighted by private subscription. There are five or six lamp-pillars in the district, but only two lamps were lit last winter. If the burgh is extended, the charge for gas will be reduced to the Broughty Ferry rate of 4s. 2d. per 1000 cubic feet, and the public lamps will be taken charge of by the Commissioners. The Dundee Gas Commissioners at present supply gas for the district to the Westward of the burgh. After the last extension, the Broughty Ferry Commissioners purchased and paid for the gas-piping in the extended portion of the burgh, and now supply the extended portion with gas, and also light the streets. But outside the last extension and within the limits of the present proposed extension, Dundee still supplies gas both to private consumers and to the public lamps. The gas for the public lamps within this district is paid for by, or charged to the inhabitants; and they also pay the Broughty Ferry Police Commissioners, through the Dundee Gas Commissioners, a charge for lighting these lamps. The account rendered for this service for the season just closed amounted to £6 15s. If this extension takes place, the Broughty Ferry Police Commissioners will, of course, be bound to take over and pay for the piping and lamps within the district, and to take charge of the public lighting for the future. The great advantage to the districts proposed to be brought within the burgh will, besides lighting, be the care of their streets, the supervision of their drains and sewers, the completion of their drainage systems, and more efficient watching." Opposition was offered to the proposal on behalf of some ratepayers; and Mr. Thornton, their spokesman, said that not only was Dundee the Local Authority of the district proposed to be annexed, but it was also the lighting authority and the water authority. And he would ask his Lordship, if he extended the burgh boundary, to see that compensation be granted to the Dundee Gas Commissioners, who had 34 consumers in the district and a revenue of £402 16s. 4d.; and the whole of them, except nine, would be taken from them. He asked his Lordship not to entertain this application until some fair arrangement was made with the Dundee Gas Commissioners as to taking over their mains and making compensation. The Sheriff said he would grant the extension.

The Aberdeen Gas Committee resolved on Tuesday to recommend the Town Council to fit up stoking machinery, driven by wire rope, in the gas-works. The cost is to be £600; and by it Mr. Smith expects to save £1500 a year. Mr. Cook suggested delay till they were able to reduce the price of gas; but Mr. Smith said he thought the machinery would help them to give the reduction, and they should have it at once. Mr. Pratt was doubtful whether they ought to get the machine, because water gas might be introduced, and it would then be of little use. To this Mr. Smith gave the explanation that water gas is already made in the works, for heating purposes, for which it is only suitable. The Committee accepted tenders for 31,000 tons of coal, at an average price of 15s. 11d. per ton. Last year, the price was 15s. 6d.; and the rise for Aberdeen is thus more moderate than is the case in some instances in the south of Scotland.

The Kettle, Freuchie, Kettlebridge, and Ladybank Gas Company, which supplies a populous district of Fifeshire, have paid a dividend of 5 per cent. for the past year.

An explosion, followed by a slight fire, took place in the Elgin Gas-Works on Monday forenoon. It is supposed that a leak existed about one of the valves of the governor, which caused the explosion, by which one of the workmen was slightly injured. The fire lasted for an hour before it was subdued by the Manager and workmen; damage to the amount of about £100, which is not covered by insurance, being occasioned. The building was a central one; and but for the efforts of the staff, the fire would have proved serious. The Manager (Mr. W. Taylor) has reported to the Commissioners that the explosion occurred on one of the men opening the door of the governor-house. The governor was wrecked, a partition wall was thrown down, and some meters in stock were damaged. The Manager has been instructed to have the necessary repairs made.

The shareholders of the Portobello Gas Company have agreed to register the Company as a limited liability concern, and to issue 500 new shares; making the number of shares issued 4000, and the paid-up capital £20,000.

In reference to the recent proceedings in the Arbroath Town Council, on the subject of the residual products contract, dealt with by our Edinburgh Correspondent last week, Mr. Briggs, the former contractor, writes: "It would not interest your readers were I to explain all that underlies the proceedings which are well summarized in the notes of your Edinburgh Correspondent; but with reference to the remarks made by one of the Gas Commissioners, 'that Mr. Briggs had complained of the high price of his contract, and had obtained hundreds of pounds back,' will you permit me to say that it is absolutely false? I never complained, except as to the disastrous period about four years ago, when, like nearly every tar distiller in the United Kingdom, I asked for some rebate, and was allowed 100 guineas on £4053."

(FROM OUR GLASGOW CORRESPONDENT.)

GLASGOW, *Saturday.*

The annual general meeting of the Falkirk Joint-Stock Gas Company is to be held on Tuesday next; and in connection with it there has been issued to the shareholders a circular of some considerable interest. It states that immediately after the close of the ordinary meeting an extraordinary general meeting of the shareholders will be held, at which it will be moved that the nominal capital of the concern be raised to £50,000, in 25,000 shares of £2 each. The circular goes on to state that the increasing consumption of gas in the district has already caused considerable expenditure for extension of pipeage and services, and demands additional holder accommodation; and the Directors have secured ground adjacent to their works at Grahamston, and made arrangements for the construction of a new tank and holder there to store 240,000 cubic feet of gas. The expenditure is estimated at about £6000; and it is proposed to raise the necessary funds by increasing the capital of the Company, and issuing to the shareholders at par, according to their respective holdings, such amount thereof as may be necessary to meet the expenditure, rather than ask extensive borrowing powers. Several other resolutions are to be moved embodying alterations which are considered by the Directors to be improvements on the Company's rules and regulations, most of which were framed upwards of 40 years ago, and are now somewhat out of date. One of the proposals is that the Directors may from time to time, notwithstanding anything contained in the rules and regulations of the Company, borrow for the Company's business a sum or sums not exceeding in all the sum of £3000 sterling, and may pledge or convey the assets of the Company in security thereof.

Mr Peter Watson, the Manager of the Stirling Gas-Works, has just put in print some interesting remarks suggested by the recent gas exhibition held in that town. He says: "Now that the use of gas-stoves for heating and cooking is likely to be more extensively adopted in Stirling, it may be well to call attention to a misapprehension that is entertained—viz., that sometimes these stoves do not work properly on account of insufficient pressure given at the gas-works. It is, of course, well known that at all gas-works the pressure by day is greatly reduced as compared with that put on at night; but that the pressure in Stirling by day is not unduly diminished is evident from the fact that more than half-a-dozen gas-engines are daily at work in the town, and no complaint of insufficient pressure is made with regard to them. If there should be, with any heating or cooking stove, a deficiency in the gas supply, it will be found that the fault is not in the want of pressure, but in defective arrangements for the due supply of gas to the stove—the supply-pipe being sometimes connected to an already existing branch which is not of sufficient capacity to pass the increased quantity needed for the stove. It is unreasonable to expect," says Mr. Watson, "that a pipe calculated for an ordinary bracket will pass also as much gas as may be consumed by a gas-fire or cooking stove. When one of these stoves is introduced, the most reliable arrangements for its sufficient working is to connect the supply-pipe directly with the meter." Mr. Watson undertakes to make an inspection and give advice, if asked, in any case where difficulty is experienced with the stove, owing to defective supply of gas.

Several weeks ago I mentioned that the Wishaw Burgh Commissioners, after a long discussion, had agreed to approve of a recommendation made to them by the Gas Committee, which was to the effect that all gas consumers should be called upon to make a deposit of 1s. per £1 of rental, otherwise their supply of gas should be withdrawn. By the general public the proposal was viewed in anything but a cordial manner—in fact, its reception could scarcely have been more unfriendly had it been an imposition by a joint-stock company, instead of "by the public for the public," seeing that all consumers are in a sense shareholders in the gas undertaking of the town, and thereby benefit by the bad debts being kept down, at which the resolution was chiefly aimed. Last Monday night, in terms of the Standing Orders, a special meeting of the Commissioners was held, for the purpose of finally approving of the resolution or of rejecting it. There was a full attendance of the Commissioners; and Provost Thomson occupied the chair. Before the business formally began, the Burgh Clerk submitted a note as to the sums lost in the shape of bad debts during the eight years that the gas-works have been in the hands of the Commissioners. The largest amount in any one year was £35 4s. 7d., and the total loss over the eight years was nearly £200, or within a trifle of an average of £25 per year. Provost Thomson, as Convener of the Gas Committee, submitted the resolution afresh for approval, and made a full restatement of the case. In the course of his remarks, he

said that it seemed as if their loss through bad debts was relatively greater than that in other similar places. He knew of one place where the consumption of gas represented about £5000 per annum, while the bad debts were under £16. He did not think their consumption realized half of this sum, and yet their loss was much greater. He suggested that either the resolution before the Commissioners, or some other, should be accepted, so as to have all gas accounts paid within eight days of their being rendered. A full discussion of the subject again took place, in which all the *pros* and *cons* of the question of which the supporters and opponents of the resolution could think, were again trotted out. It was stated by Bailie Russell that the loss could not be considered excessive, as it only amounted to about 1 per cent. of the sum paid for gas. Several of the speakers were decidedly of opinion that if the resolution were adopted, a great number of persons would cease to consume gas. Mr. M'Chrystal stated that the arrears were, on an average, 1·35 per cent. for the first four years that the gas supply was in the hands of the Commissioners; for this year they amounted to 0·64 per cent.; and for the four years previous the loss was 0·81 per cent. On the vote being taken, the proposal was lost.

Last Wednesday, at a meeting of the Finance Sub-Committee of the Glasgow Gas Trust, it was reported that the collection of gas-rents up to date for 1888-9 amounted to £290,581, as compared with £283,392 for the corresponding period of 1887-8. There was thus the very material increase of £7189. The financial year of the Trust closed yesterday, May 31; but, judging by the number of payments being made to-day at the Gas Office, it is not unlikely that there will be a very material further increase to be embodied in the annual balance-sheet. The revenue from the sale of residual products also shows a very considerable advance; amounting to more than £13,000 as at the end of April.

There has lately been submitted to the Glasgow Gas Trust Works Sub-Committee an application for a supply of gas to the village of Duntocher, which is not very far distant from Dalmuir, on account of which application was also made and refused last month.

On Wednesday of this week, the Glasgow Corporation 9 per cent. gas annuities were dealt in on the Glasgow Stock Exchange at £282; being an advance of 10s.

The Glasgow pig-iron market was quiet during most of the week, the price of Scotch warrants falling gradually from 43s. 3½d. per ton on Monday, to 42s. 5½d. yesterday. This afternoon, however, there was a rapid recovery; and the price closed at 43s. 3d. cash buyers. This recovery seemed partly due to some large buying orders for hematite iron; but it was no doubt greatly accentuated by uneasiness on the part of the "bears." In Scotch special brands there is not much business being done.

Little change has taken place this week in the local coal trade. Prices are well maintained at previous rates. Steam coal is in free demand for all qualities. The Glasgow gas coal contracts are about to be advertised, and much excitement in the local trade will result.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *June* 1.

Sulphate of Ammonia.—There has been a good demand for prompt and forward parcels, although a good deal of the future business is for speculative account. The spot value f.o.b. Hull has advanced to £12 and £12 2s. 6d.; Leith, £11 17s. 6d. to £12; and Liverpool, £12 to £12 1s. 3d. For summer delivery there appear to be now buyers at £12, Leith and Hull. German consumers, who have been the most active of continental buyers recently, and have covered a fair share of their requirements, display less eagerness at the close; and very few of the French and Belgian consumers seem willing to contract at present values. The nitrate market being so dull, and the position of this commodity far from encouraging to holders, it cannot be wondered at that so many consumers refuse to pay such a large premium for sulphate, and which, in view of the lowering tendency of nitrate, may be still further increased. The price of sulphate is to-day nearly 10s. higher than last year, and nearly 15s. dearer than in 1887; while nitrate was then quoted 9s. 4½d. and 10s. respectively, and which makes the present margin appear very excessive. To-day's visible supply of nitrate is nearly 100,000 tons in excess of last year.

LONDON, *June* 1

Tar Products.—The demand for crude carbolic and solvent naphtha is very strong. Most of the other products are in a more or less languid condition. Anthracene is not at the moment saleable; buyers apparently having made up their minds to leave this article severely alone. Stocks, however, are not large; and makers would do well in the meantime to withhold offering. Higher prices are being paid for tar; and it looks as if the old ruinous competition amongst distillers for raw material has been renewed. Prices: Tar, 22s. 6d. to 26s. according to position. Benzol, 90 per cent., 3s. per gallon; 50 per cent., 2s. 2d. per gallon. Toluol, 1s. 6d. per gallon. Solvent naphtha, 1s. 3d. per gallon. Crude naphtha (30 per cent.), 1s. 1d. per gallon. Light oil, 3½d. per gallon. Creosote, 2¼d. per gallon. Pitch, 22s. 6d. per ton. Carbolic acid (crude), 3s. 10d. per gallon. Cresylic acid, 10d. per gallon. Tar salts, 17s. 6d. per ton. Anthracene (30 per cent.), "A" quality, 1s. 3d. per unit; "B," 1s., according to quality.

Ammonia Products.—There is an exceptionally good demand for sulphate, both for prompt and forward delivery extending as far as September. Large business has been transacted at prices varying, according to position, from £11 17s. 6d. to £12 5s. per ton. Prices of other products: Gas liquor (5° Twaddel), 8s. per ton, with a rise or fall of 1s. 6d. per degree. Sulphate of ammonia, £11 17s. 6d. to £12 5s. per ton. Liquor ammonia, 2d. per lb. Carbonate of ammonia, from 3d. to 3½d. per lb. Muriate of ammonia, brown, £19 per ton; white, £23 15s. per ton. Salammoniac, £30 to £32 per ton.

FREE COOKERY LESSONS AT WOOLWICH.—In consequence of the success attending the recent course of free cookery lessons at Woolwich, the South Metropolitan Gas Company have arranged for another four days' course, commencing yesterday.

PORTSMOUTH AND SOUTH HANTS ELECTRICITY SUPPLY COMPANY, LIMITED.—This Company has just been registered with a capital of £50,000, in £5 shares, to form centres in Hampshire at which electric power may be generated or accumulated, and from which it may be distributed for the purpose of lighting private houses, street lighting, &c.

BLACKBURN CORPORATION GAS SUPPLY.—We have received from the Engineer and Manager of the Blackburn Corporation Gas-Works (Mr. S. R. Ogden) copies of the balance-sheet and working statement of the gas undertaking for the year ending March 25 last. Reserving till next week our usual extracts from the accounts, we may say that the balance carried to the profit and loss account is £27,299, as against £26,422 last year. The total of this account is £27,401; and after paying thereout the interest on loans, &c., there was a balance of £1925 carried to the reserve fund account, bringing it up to £8829. Of this sum, £5007 had been employed in the renewal of plant and the fitting of stoking machinery at No. 2 station.

EXTENSION OF THE ALTRINCHAM GAS-WORKS.—An extension will be carried out in the retort-house of these works by the addition of new benches of retorts, with all the necessary ironwork. The work is to be executed by Messrs. R. and J. Dempster, of Manchester, according to plans prepared by Mr. J. Paterson, of Warrington.

CANTAREIRA WATER COMPANY.—The revenue of the Cantareira Water Supply and Drainage Company of the City of Sao Paulo (Brazil) for the year ended Dec. 31 last amounted to milreis 385,572 460r. and the expenditure to milreis 68,058 737r.; showing an excess of receipts over expenditure of milreis 317,513 723r.—equal, at the present exchange of 27d. per milreis to £35,721 8s. 4d.

SUGGESTED INCREASE OF THE PRICE OF GAS AT LEEDS.—At the meeting of the Leeds Town Council to-morrow (Wednesday), Mr. E. Wilson will propose the following resolution:—"That this Council, having considered the present position of the Corporation gas-works, and the accounts issued by the Gas Committee, is of opinion that the time has arrived when the price charged to the consumers of gas should be raised; and that the price be raised to such an amount as the Council shall determine, to take effect from the 30th of June, 1889."

OTFORD WATER SUPPLY.—A public meeting was held at Otford last Thursday, to consider the question of the water supply, as the Sevenoaks Rural Sanitary Authority have rejected the scheme of the Kent Water Company in favour of an expensive plan prepared by their own officials. On the proposition of Dr. Hunt, it was decided to petition the Local Government Board not to sanction the proposals of the Sanitary Authority. Dr. Hunt said he had seen the Secretary of the Water Company, and was informed that they intended to extend their mains to Dunton Green, Chipstead, Brasted, and Sundridge.

THE WATER QUESTION AT STAINLAND.—The reply of the Local Government Board to the Stainland Local Board's application for borrowing power to carry out the Coldacre scheme has been received by the Clerk to the Board. They decline to sanction the scheme until the Board have come to an agreement with the riparian owners on the streams which are partly fed by the springs proposed to be acquired; and they require that storeage for a large quantity of water should be provided. This reply amounts to an absolute refusal on the part of the Local Government Board to sanction the borrowing of money to carry out the scheme, inasmuch as the riparian owners are the promoters of a rival scheme.

THE COMBINATION AMONG GAS WORKMEN.—Several large meetings of London gas workmen have been held on Sundays since the movement which they have initiated for obtaining a reduction in the hours of labour and the quantity of work to be performed took definite shape at the meeting on the 12th ult. (see *ante*, p. 915). It appears that, owing to the dismissal of two stokers from the Beckton works without the customary notice, proceedings are to be taken against The Gaslight and Coke Company. One of the discharged men presided at a gathering of between 6000 and 7000 men which took place at Deptford on the 26th ult., when addresses were delivered by Mr. Herbert Burrows, the Socialist, Mr. R. B. Cuninghame Graham, M.P., and others. Mr. Graham advocated representation of gas stokers in Parliament, as miners are represented.

HALSTEAD WATER SUPPLY.—Last Tuesday, Colonel Ducat, R.E., one of the Local Government Board Inspectors, held an inquiry at the Town Hall, Halstead, respecting the application of the Halstead Local Board to borrow £2200 in addition to the £4500 already sanctioned for their new water-works. Mr. Jabez Church, M. Inst. C.E., Consulting Engineer to the Local Board, explained the further works which will absorb the amount asked for. After a few observations from some of the ratepayers, the Inspector closed the inquiry; remarking that he had been over the work in progress, with Mr. Church, and was very pleased with it. He congratulated the Engineer upon his scheme, and told the ratepayers present that, for the very reasonable amount of £6500, they would have excellent works, which would ensure the town an ample supply of good water.

NORTH SHIELDS WATER COMPANY.—The annual meeting of this Company was held last Thursday, when the report presented by the Chairman (Mr. J. Jackson) recommended the declaration of a dividend of 2 per cent., which, with the interim dividend of 1½ per cent., made a total of 3½ per cent. for the year. This will amount to a sum of £1200. The Duke of Northumberland's one-seventh share of the clear annual profits for the year ending May 1, 1889, is payable in September, and amounts to £647. After paying these amounts, a balance of £341 will remain to the credit of the profit and loss account. The Chairman, in moving the adoption of the report, said they had improved their position by adding a further ¼ per cent. to the dividend. The Duke of Northumberland, he mentioned, had been approached concerning the one-seventh share of the profits; but so far nothing definite had been arrived at. The report was adopted.

LEIGH LOCAL BOARD GAS SUPPLY.—According to the report on the gas undertaking of the Leigh Local Board which has lately been presented by the Clerk (Mr. G. Dickinson), the profits for the year ending March 25 last were £1569 12s. 5d. The receipts for gas were £9178 6s. 7d.; the total receipts, £10,913 7s. 7d. The outgoings (including interest and the amount added to the sinking fund), came to £9343 15s. 2d. The quantity of gas registered by the station meter was 57,560,000 cubic feet; the quantity sold was 55,164,400 cubic feet; and that used on the works, 412,600 cubic feet. The unaccounted-for gas was therefore 1,983,000 cubic feet, or 3·44 per cent., against 4·22 per cent. in the previous year. The quantity of coal and cannel carbonized was 5205 tons; the gas produced per ton being 11,059 cubic feet, of which 10,599 cubic feet were sold. The increase in the make of gas last year, as compared with the year 1887-8, was 3,016,000 cubic feet, or 5·53 per cent.; the increase in the sales being 3,284,200 cubic feet, or 6·33 per cent. The gas loans (which stood at £72,963 19s. on March 25, 1883, were brought down to £72,163 19s. in the course of the past financial year.

EAST SURREY WATER COMPANY.—Although the past year was unusually cool and wet, and therefore the demand for water, for many special and fluctuating purposes, was considerably less than in the preceding year, the Directors of this Company, in the report presented to the shareholders last Saturday, stated that, owing to the steady increase in the number of the regular consumers, there was a substantial addition to the annual income. The number of new consumers was 275; and, to provide for the wants of the district, about 9 miles of new mains were laid. A sum of £10,000 was authorized to be raised at the last general meeting; and in accordance with the feeling then expressed, this was offered by circular, in the form of ordinary shares, to the existing proprietors. In response, applications for more than double the number of shares were received; and this enabled the Directors to make the allotment wholly among those interested in the undertaking. The balance of profit and loss account was £2754 15s.; and the Directors recommended the shareholders to declare dividends of 5 per cent. and 4½ per cent. per annum respectively upon the preference shares, a moiety of which dividends was paid on Dec. 5 last, and a dividend of 4 per cent. upon the ordinary shares.

WIGAN CORPORATION WATER SUPPLY.—The water-rents of the Wigan Corporation showed a falling off in the last, as compared with the two previous financial years. The figures were £8802 in 1888-9; £8842 in 1887-8; and £9002 in 1886-7. The total expenditure was increased in the past year by upwards of £200; and only £747 was available at the close for the general district rate account.

THE THIRLMERE WATER SCHEME.—Messrs. Watt and Wilson, railway and public works contractors, of Glasgow, have lately received an acceptance from the Water-Works Committee of the Manchester Corporation for the execution of the work comprised in the Thirlmere aqueduct contract No. 7, which is upwards of 19 miles in length, and includes two miles of tunnels. The contract price is £142,255.

THE PURCHASE OF THE MANSFIELD WATER-WORKS BY THE IMPROVEMENT COMMISSIONERS.—At a special meeting of the Mansfield Improvement Commissioners held on May 24, it was resolved that the seal of the Board be affixed to the agreement made by the Commissioners and the Mansfield Water Company for the purchase of the works of the latter. It was resolved that the Clerk should write to the Local Government Board asking their permission to borrow the sum of £30,500 for the purchase of the undertaking and other expenses connected therewith; and also requesting them to give instructions for the usual inquiry to be held at an early date, in order that the purchase may be completed by Sept. 29.

NEW WATER-WORKS AT HINCKLEY.—With a view to providing a plentiful supply of water for the inhabitants, the Hinckley Local Board are about to expend something like £14,000 in the construction of new water-works. Messrs. T. and C. Hawksley, of Westminster, are the Engineers; and in the scheme they have decided upon, they contemplate obtaining a supply of water from Snarestone. Here it is intended to erect a pumping-station—with two double-power rotative pumping-engines, having 24-inch cylinders and three boilers and pumps, and other works, with engine-house and cottage for the attendant engineer. At Hinckley there will be erected a water-tower, having at the summit a cast-iron water-tank with a capacity of 50,000 gallons; and a covered reservoir will also be constructed.

AN OLD WELL AT BARTON.—An old well discovered in the cutting of the Manchester Ship Canal at Salt Eye, about a mile west of Barton Aqueduct, is a remarkable piece of work. It is 260 feet deep, and the mouth for a depth of 4 feet is about 8 feet in diameter. An iron tube has been driven into the hole, out of which water rises at the rate of about 5000 gallons per hour. There was a deposit of clay or soil over the mouth of the well 10 or 12 feet thick. What the purpose of the well can have been, and the date of its construction, can only be matters of conjecture. Its age is roughly estimated at about 100 years. As there are no indications of works or residences in the vicinity, it was apparently not intended for domestic or manufacturing purposes. The opinion of local antiquaries is that it is an unfinished coal-pit shaft.

WAKEFIELD CORPORATION WATER SUPPLY.—A few points of interest concerning the water supply were mentioned at the meeting of the Wakefield City Council yesterday week. It appeared from the minutes of the Water-Works Committee that they had come to terms with the Castleford Local Board to supply that district with water. They had also made a fresh arrangement with the Featherstone Local Board, by which they will receive their supply from the Corporation's large main at Warmfield, instead of at the city boundary; and for this privilege the Board have agreed to pay ¾d. per 1000 gallons more than they had previously arranged to pay. The Chairman of the Committee, in answer to Mr. Kilner, said the maximum supply to the Castleford Local Board would be 250,000 gallons per day; and the Local Board could either use that quantity or sell it. He proceeded to congratulate the Council and the ratepayers on the arrangement made with the Castleford Local Board, saying that he was informed that they would pay the Corporation about £2000 per year for water. Wakefield had now about reached the length of their tether in selling water, until the new or additional water-works were carried out; and he was happy to state that the opposition of the mill-owners to the Corporation's Bill now before Parliament had been withdrawn. They had great reason to be satisfied that they had done away with what appeared to be a very formidable and, at the same time, a very unjust opposition. In reply to Mr. Wade, the Chairman said he supposed it would be about five years before the Corporation were in a position to sell water to any more of the surrounding districts.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

(For STOCK MARKET INTELLIGENCE, see *ante*, p. 1035.)

Issue.	Share	When ex-Dividend.	Dividend or Div. & Bonus.	NAME.	Paid per Share	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.	GAS COMPANIES.				£ s. d.
590,000	10	11 Apr.	10½	Alliance & Dublin 10 p. c.	10	18—19	..	5 10 6
100,000	10	„	7½	Do. 7 p. c.	10	13—14	..	5 7 2
800,000	100	2 Jan.	5	Australian (Sydney) 5% Deb.	100	111—113	..	4 8 6
100,000	20	30 May	10	Bahia, Limited	20	23—25*	..	8 0 0
200,000	5	15 May	7½	Bombay, Limited	5	7¼—7½	+¼	4 16 8
40,000	5	„	7½	Do. New	4	5—5¼	..	5 9 1
880,000	Stck.	14 Feb.	11½	Brentford Consolidated	100	229—234	..	5 0 5
125,000	„	„	8½	Do. New	100	167—172	..	5 1 9
220,000	20	14 Mar.	10½	Brighton & Hove, Original	20	42—45	..	4 13 4
320,000	20	28 Mar.	11½	British	20	45—47	..	4 15 9
50,000	10	14 Mar.	11	Bromley, Ordinary 10 p. c.	10	20—23	..	5 0 0
89,000	10	„	8	Do. 7 p. c.	10	18½—14½	..	5 10 4
828,750	10	30 May	10	Buenos Ayres (New) Limited	10	16—17*	+¼	5 17 8
200,000	100	2 Jan.	6	Do. 6 p. c. Deb.	100	107—110	..	5 9 1
150,000	20	28 Feb.	8	Cagliari, Limited	20	25—27	..	5 18 6
550,000	Stck.	11 Apr.	13½	Commercial, Old Stock	100	268—273	..	5 0 8
180,000	„	„	10½	Do. New do.	100	x14—219	..	4 18 2
180,000	„	28 Dec.	4½	Do. 4½ p. c. Deb. do.	100	123—128	..	3 10 3
557,320	20	13 Dec.	13	Continental Union, Limited	20	47—49	..	5 6 2
242,680	20	„	13	Do. New '69 & '72	14	33—34	..	5 6 7
200,000	20	„	10	Do. 7 p. c. Pref.	20	38—40	..	5 0 0
75,000	Stck.	28 Mar.	10	Crystal Palace District	100	204—208	..	4 16 2
234,060	10	30 Jan.	13	European, Limited	10	25½—26½	..	4 18 1
120,000	10	„	13	Do. New.	5	17½—18½	..	5 5 3
354,060	10	„	13	Do. do.	5	12½—13½	..	4 16 3
5,468,600	Stck.	14 Feb.	13	Gaslight & Coke, A, Ordinary	100	256—261	+2½	4 19 8
100,000	„	„	4	Do. B, 4 p. c. max.	100	100—105	..	3 16 3
665,000	„	„	10	Do. C, D, & E, 10 p.c. Pf.	100	256—261	−1	3 16 7
80,000	„	„	5	Do. F, 5 p. c. Prf.	100	123—128	..	3 18 1
60,000	„	„	7½	Do. G, 7½ p. c. do.	100	182—187	..	4 0 2
1,800,000	„	„	7	Do. H, 7 p. c. max.	100	165—170	−1	4 2 4
463,000	„	„	10	Do. J, 10 p. c. Prf.	100	255—260	−1	3 16 11
1,061,150	„	13 Dec.	4	Do. 4 p. c. Deb. Stk.	100	119—122	..	3 5 7
294,850	„	„	4½	Do. 4½ p. c. do.	100	125—130	..	3 9 3
650,000	„	„	6	Do. 6 p. c. do.	100	171—176	−1½	3 8 2
3,600,000	Stck.	15 May	10	Imperial Continental	100	204—208	+1	4 16 1
75,000	5	13 Dec.	6	Malta & Mediterranean, Ltd	5	5—5¼	..	5 9 1
560,000	100	1 Apr.	5	Met. of Melbourne, 5 p.c. Deb.	100	113—115	..	4 6 11
541,920	20	29 Nov.	6	Monte Video, Limited	20	19½—20½	+½	5 17 1
150,000	5	30 May	10	Oriental, Limited	5	9½—10*	+¼	5 0 0
60,000	5	28 Mar.	7	Ottoman, Limited	5	6½—6¾	..	5 3 8
166,870	10	16 Jan.	4	Pará, Limited	10	5¾—6	..	6 13 4
				People's Gas of Chicago—				
420,000	100	2 May	6	1st Mtg. Bds.	100	103—107	..	5 12 1
500,000	100	1 June	6	2nd Do.	100	95—99*	..	6 1 3
100,000	10	26 Apr.	10	San Paulo, Limited	10	16—17	..	5 17 8
500,000	Stck.	28 Feb.	16½	South Metropolitan, A Stock	100	317—322	..	5 0 11
1,350,000	„	„	12½	Do. B do.	100	238—243	−3	4 19 9
141,500	„	„	12½	Do. C do.	100	260—270	..	4 18 1
600,000	„	28 Dec.	5	Do. 5 p. c. Deb. Stk.	100	137—140	..	3 11 5
60,000	5	28 Feb.	11½	Tottenham & Edm'ntn, Orig.	5	11—13	..	4 8 5
						*Ex div		
				WATER COMPANIES.				
717,467	Stck.	28 Dec.	9	Chelsea, Ordinary	100	265—270	+3	3 6 8
1,720,560	Stck.	11 Apr.	7½	East London, Ordinary	100	204—208	..	3 12 1
700,000	50	18 Dec.	9	Grand Junction.	50	122—126	..	3 11 5
708,000	Stck.	14 Feb.	10½	Kent	100	272—277	..	3 15 9
1,043,800	100	28 Dec.	9	Lambeth, 10 p. c. max.	100	252—257	+2	3 10 0
406,200	100	„	7½	Do. 7½ p. c. max.	100	199—204	..	3 13 6
200,000	Stck.	28 Mar.	4	Do. 4 p. c. Deb. Stk.	100	118—120	..	3 6 8
500,000	100	14 Feb.	12½	New River, New Shares	100	348—353	..	3 8 8
1,000,000	Stck.	30 Jan.	4	Do. 4 p. c. Deb. Stk.	100	126—129	..	3 2 0
902,300	Stck.	13 Dec.	6	S'thwk & V'xhall. 10 p.c. max.	100	175—180	+2	3 6 8
126,500	100	„	6	Do. 7½ p. c. do.	100	164—169	+2	3 11 0
1,155,066	Stck.	13 Dec.	10	West Middlesex	100	266—271	+2	3 13 10

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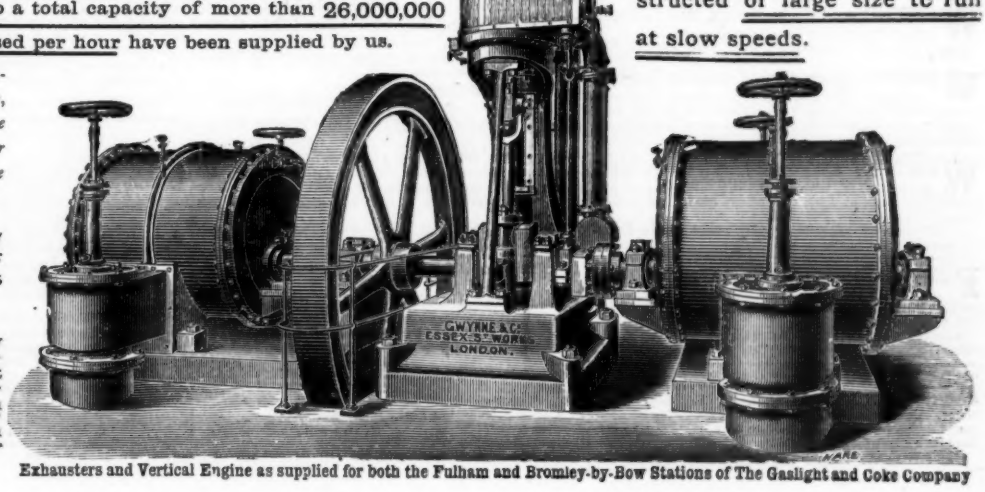
Our new Patent Non-Fluctuating Exhausters, to work without the slightest oscillation or variation in pressure, are strongly recommended.

MAKERS OF EVERY DESCRIPTION OF HYDRAULIC AND GAS MACHINERY.

Gwynne & Co.'s New Catalogue and List of Testimonials can now be obtained on application.

We supply only the very highest quality of Machinery; and our Exhausters are constructed of large size to run at slow speeds.



Exhausters and Vertical Engine as supplied for both the Fulham and Bromley-by-Bow Stations of The Gaslight and Coke Company

OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale in the United Kingdom than all other Oxides combined. Purity and uniformity of quality guaranteed. Pamphlet, "How to Purchase Bog Ore," to be obtained on application.

Gas Purification and Chemical Company, Limited, Palmerston Buildings, Old Broad Street, London, E.C.

JOHN WM. O'NEILL, Managing Director.

ANDREW STEPHENSON, Agent for the GAS PURIFICATION AND CHEMICAL COMPANY, Limited, Palmerston Buildings, Old Broad Street, LONDON, E.C.

CANNEL COAL, &c.

JOHN ROMANS & SON, EDINBURGH.

Gas Engineers, supply all the most approved COTTISH CANNELS; also FIRE-CLAY GOODS, CAST-IRON PIPES, and other APPARATUS for GAS AND WATER WORKS.

Prices, &c., will be forwarded on application to No. 80, ST. ANDREW SQUARE, EDINBURGH, / No. 54, BERNARD STREET, LEITH, } SCOTLAND.

SULPHATE of Ammonia Lead Work and Fittings. Lead Burner. Tanks and Saturators made and repaired on the shortest notice.

Address P. J. DAVIES, 78, Earl's Court Road, Kensington, LONDON.

DRAUGHTSMAN wanted, accustomed to Gas Engineering Construction.

Address, with particulars, age, and salary expected, D. R. T. S., care of Samuel Deacon and Co., 154, LEADENHALL STREET, E.C.

ASSISTANT MANAGER WANTED.

THE Bombay Gas Company, Limited, will require the services of a Gentleman to proceed to Bombay about August next as ASSISTANT MANAGER. Age about 24. Salary Rupees 300 per month, and Rupees 50 per month for House Rent. Terms of engagement Five years. Applicants must be practically acquainted with Gas Engineering, Manufacture, and Accounts, as well as be qualified to undertake any duties (indoor or outdoor) which may be allotted to him by the Manager.

Applications, by letter, stating age, and accompanied by copies of testimonials, to be addressed under cover to the Secretary of the Company, 6, Drapers' Gardens, London, E.C., and sent in on or before the 11th prox.

WANTED, an experienced Gas Engi- neer to superintend the Erection of Retort-Benches on the Dinsmore Process.

Apply to the DINSMORE GAS COMPANY, Batavia Buildings, LIVERPOOL.

WANTED, for a Gas-Works making 25 millions, a good WORKING FOREMAN. Must be a good Carbonizer, and competent to do the Fitting inside and outside the Works, and also Rough Smithing. Those able to do Retort Setting will be preferred. This would suit a man who has held a similar position in a smaller Works. None but strictly sober men need apply. Wages 35s. per week; an increase would depend on the man.

Apply in first place, with testimonials as to character, &c., to No. 1713, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

MILFORD IMPROVEMENT ACT, 1857.

CLERK of Works, experienced in every detail of Gas-Works Erection, required for about four months, from the 24th of June, 1889, to supervise the erection of NEW GAS-WORKS at Milford Haven. Salary £2 10s. per week, to include supervision of overtime work (if any).

The person appointed will be required to devote his whole time to his duties as Clerk of the Works, and will be required to be on the Works at all times when work is being executed.

Applications, addressed to the Chairman of Commissioners, Milford Haven, and endorsed "Clerk of Works," together with testimonials, must be sent in on or before Wednesday, the 19th of June, 1889.

Further particulars on application to the undersigned.

PEREGRINE THOMAS,
Clerk to the Milford Improvement Commissioners.

Commissioners' Offices,
Milford Haven, May 28, 1889.

STATION METER.

WANTED, a Station Meter, with 4-inch Connections, and in good going order.

Apply to JAMES CAMPBELL, Writer, SALTCOATS.

WANTED—Any Gas Company having for Sale one LIVESEY WASHER, and one KIRKHAM'S SCRUBBER for 500,000 feet per day, will please communicate with Mr. LONGWORTH, Gas Offices, GUILDFORD.

WANTED, a Second-hand Gasholder, 10 ft. by 7 ft., with Tank complete. Also GAS PURIFIER, 8 ft. by 4 ft.; and about 120 feet of 5-inch flanged CAST-IRON PIPING.

Particulars, by letter, to No. 1712, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

FOR SALE—Tar Stills, in sound con- dition. Distilling capacity, 8 to 18 tons. STEAM PUMP, 5-inch Ram, double-acting. ANTHRACENE FILTER PRESSES.

Address CULPAN AND SONS, Heckmondwike, YORKSHIRE.

FOR SALE—A 5000 cubic feet per hour ROTARY EXHAUSTER, in thorough good order. Being removed for a larger one. May be seen working up to the middle of June on application to the Resident Foreman.

Apply to the GAS-WORKS, Uxbridge, MIDDLESEX.

TIMMIS & CO., of STOURBRIDGE Make only the best quality of FIRE-CLAY RETORTS, BRICKS, TILES, & LUMPS. Also SPECIAL SILICA BRICKS, to stand great heats.

All descriptions kept in Stock.

For Prices apply to JAMES LAWRIE AND CO, 1, Whittington Avenue, Leadenhall Street, E.C., Sole Agents for London and District.

Telegraphic Address: "EIRWAL, LONDON."

ALEX. WRIGHT & Co., 55, 55a, and 56, MILLBANK STREET, LONDON, S.W.

[Telegraphic Address: "PRECISION LONDON."]

Makers of Wet and Dry Gas-Meters, Station Meters and Governors, Photometers, and Gas-Testing Apparatus, Test Gasholders and Meters, Registering and other Gauges, &c., &c.

*** See Advertisement on Page III. of the Wrapper of this week's issue.

W. C. HOLMES & Co., Huddersfield, AND 20, CANNON STREET, LONDON,

Contractors for Gas-Works complete, Makers of Gasholders, Purifiers, Scrubbers, Condensers, Retort Fittings, &c., Improved Valves, Engines, and Exhausters. Also for Collingwood's Regenerative Retort-Settings.

*** See Advertisement p. 1019 of last week's issue.

Cablegrams: "Ignitor London." Telegrams: "Holmes Huddersfield."

J. & J. BRADDOCK, Globe Meter Works, Oldham.

First-Class Award. Melbourne Exhibition, 1889, for Wet and Dry Gas-Meters, Station Meters, and Governors, Pressure-Gauges, Street Lamps, and Pillars, &c.

Telegraphic Address: "Braddock, Oldham."

SULPHURIC ACID.

HUGH WALLACE & CO., Chemical Manufacturers (the old-established firm), supply the above, which is specially adapted for making White Sulphate of Ammonia. The latter purchased in any quantities at highest market prices, or contracts for the year.

For price and terms apply Botolph House, Eastcheap, LONDON, E.C.

GAS CARBON FOR SALE.

THE Maidstone Gas Company has about 15 tons of GAS CARBON for Sale.

Apply to the MANAGER.

FOR SALE, Second-hand—A small STATION GAS-METER, 4 ft. 6 in. by 4 ft. 6 in.

Apply to R. LAIDLAW AND SON, Sim on Square Works, EDINBURGH.

FOR SALE—Freehold Manufacturing PREMISES in Birmingham. Price £8000, one-half of which may remain on Mortgage. Has good Shopping, with 6-horse power Steam-Engine and Cornish Boiler; also Blacksmith's Shop and Stores, and spare Land sufficient to develop a large Business. Situated on a Main Road, midway between the Stations of two Railway Companies; about five minutes' walk from either.

Apply, by letter, to No. 1714, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

FOR SALE—The Directors of the Ilkley Gas Company have FOR SALE:

One GAS SCRUBBER, 21 ft. by 4 ft. 6 in., filled with Boards; in good condition.

One KIRKHAM AND HULETT'S PATENT GAS WASHER; capacity, 12,000 cubic feet per hour.

One KORTING'S STEAM-JET EXHAUSTER, 5000 cubic feet per hour.

May be seen at work, and will be removed shortly for alterations and enlargements.

For further particulars, apply to the MANAGER, Gas-Works, Ilkley, YORKS.

FOR SALE—Four Purifiers, 16. ft by 12 ft. by 3 ft. 9 in. deep inside, with 12-inch Centre-Valve (Walker's) and Connections. Practically equal to new. Would erect complete.

Also Four PURIFIERS 12 ft. by 6 ft. 9 in. by 3 ft. deep inside, with 10-inch Centre-Valve and Connections. Do.

Also One Cast-Iron SCRUBBER 40 ft. high by 10 ft. diameter.

Also One Cast-Iron SCRUBBER 24 ft. high by 10 ft. diameter.

Inquiries invited for various second-hand Gas Plant—Gasholders, Tanks, Purifiers, Washers, Exhausters, Station Meters, &c.

Apply to SAML. WHILE (late Ashmore and While), 60, Queen Victoria Street, LONDON, E.C.

THE Wellingborough Gaslight Com- pany, Limited, invite TENDERS (not later than June 10) for the purchase of their surplus TAR during the next Twelve months.

Particulars on application.

S. H. KIMBELL, Secretary.

THE Knutsford Light and Water Com- pany are prepared to CONTRACT for 1100 tons of GAS COAL or NUTS, and 200 tons of CANNEL; the whole to be screened and free from all objectionable matter, and to be delivered, carriage free, at Knutsford Station, between July 1, 1889, and July 1, 1890, as required.

Tenders to be sent in on or before Tuesday, the 18th of June, to the Chairman of the Company, Knutsford.

FENTON URBAN SANITARY DISTRICT.
(GAS DEPARTMENT.)

THE Gas Committee are prepared to receive TENDERS for the purchase of the surplus TAR produced at their Works, for a period of One year, commencing the 1st of July next.

Sealed tenders, addressed to J. Gimson, Esq., Chairman of the Gas-Works, to be sent in not later than the 18th day of June, 1889.

Form of tender and further information may be obtained on application to the undersigned.

F. H. DARWIN, Manager.

Gas Offices, Fenton,
Staffordshire May 22, 1889.

IRISH BOG ORE OXIDE OF IRON.

GAS PURIFICATION.

BALE, BAKER, & CO., direct Importers from Ireland. Sample and Price on application. Spent Oxide and Sulphate of Ammonia purchased.

120 and 121, NEWGATE STREET, LONDON, E.C.

SULPHURIC ACID.

JOHN NICHOLSON & SONS, Chemical Works, LEEDS, specially produce this ACID for making SULPHATE OF AMMONIA of high quality and colour.

Highest References and all particulars supplied on application.

STEAM-JET PUMPS.

MELDRUM Bros., Engineers, of 26, Half Street, Cathedral Yard, Manchester, make and supply STEAM-JET ELEVATORS for Gas Liquor, Sulphuric Acid, Water, &c., specially proportioned for working conditions. Increase of temperature under 1° Fahr. per foot vertical for Water. Prices ap lication.

STAPP'S Water-Gas Patents Company, Limited, is prepared to LEASE GAS-WORKS in the United Kingdom, or to supply PLANT, and adapt the same to existing Works, to make a pure Gas, to be supplied at a low price.

Address, with full details, SECRETARY, 120, CANNON STREET, E.C.

TO TAR DISTILLERS.

THE Dukinfield Local Board (Gas De- partment) require OFFERS for the TAR produced at the Works for One year from the 1st of July next.

For particulars apply to
HARRISON VEEVERS, C.E.,
Engineer and Manager.

Gas-Works, Dukinfield,
May 31, 1889.

DARWEN CORPORATION GAS-WORKS.

THE Gas Committee of the above Cor- poration are prepared to receive TENDERS for the supply of WET AND DRY GAS-METERS.

Particulars from the undersigned.

Sealed tenders, endorsed "Meters," to be delivered to C. Costeker, Esq., Town Clerk, Darwen, not later than Ten a.m., June 13, 1889.

By order,
THOS. DUXBURY, Manager.

NELSON LOCAL BOARD.

THE Nelson Local Board Gas Committee invite TENDERS for the supply of 11,000 tons of GAS COAL, to be delivered at the Lancashire and Yorkshire Railway Siding, or at the Leeds and Liverpool Canal Wharf.

Conditions and forms of tender may be obtained from Mr. Wm. Foster, Gas Engineer, Nelson.

Sealed tenders to be addressed to the Chairman of the Gas Committee, endorsed "Gas Coal," and sent or delivered to me not later than the 26th inst.

By order,
R. M. PRESCOTT,
Clerk to the Board.

Town Hall, Nelson,
Lancs., June 3, 1889.

TENDERS FOR GAS COAL.

THE Directors of the Victoria New- market Gaslight and Coke Company, Limited, invite TENDERS for the supply of best screened GAS COAL, for One or Two years, commencing the 1st of July next. The quantity required will be about 4000 tons annually.

Tenders, stating price per ton, delivered free at Newmarket Station as required, to be sent to the undersigned on or before June 15, 1889, from whom any further particulars may be obtained.

The Directors do not bind themselves to accept the lowest or any tender.

By order,
THOMAS WILKINSON,
Manager and Secretary.

Gas-Works, Newmarket,
May 25, 1889.

COAL CONTRACT.

THE Gas Committee of the Newry Town Commissioners are prepared to receive TENDERS for 2800 to 3300 tons of best screened GAS COAL, to be delivered free, *ex* Sailing Vessel, at the Albert Basin, Newry, and in such quantities as may be required during the next Twelve months from tender being accepted.

Particulars of contract may be obtained on application to Mr. A. Gibb, Manager.

Tenders, sealed, endorsed, and addressed to the Chairman, Gas Committee, Newry, will be received by me up to the *morning post* delivery of Monday, June 10 next.

The Committee do not pledge themselves to accept the lowest or any tender.

JOHN KERNAGHAN, Secretary.

Gas-Works, Newry,
May 27, 1889.

WANDSWORTH AND PUTNEY GASLIGHT AND COKE COMPANY.

TAR CONTRACT.

THE Directors of the above Company are prepared to receive TENDERS for the surplus TAR produced at their Works at Wandsworth during the Twelve months next, from the 1st of July, 1889.

The Contractor is to remove the Tar by barges whenever required by the Company's Engineer.

Payments to be made by cash monthly.

Tenders, endorsed "Tender for Tar," to be sent in on or before June 22 inst.

The Directors do not bind themselves to accept the highest or any tender.

By order,
W. CROMARTY, Secretary.

98, North Street, Wandsworth,
May 31, 1889.

THE Isle of Thanet Gas Company invite TENDERS, to be delivered on or before Tuesday, June 18, 1889, for the supply of 9500 tons of the best Seaborne GAS COAL.

Particulars and times of delivery may be had on application to

THOMAS C. FULLER, Secretary.

Gas-Works, Margate,
May 24, 1889.

BOROUGH OF MOSSLEY.

THE Gas Committee of the Mossley Corporation are prepared to receive TENDERS for the surplus TAR and AMMONIACAL LIQUOR that may be produced at their Gas-Works, Roaches, for Twelve months, from the 30th of June next.

Particulars and forms of tender may be obtained from the Manager, Mr. R. Merrell, at the Gas-Works.

Tenders, endorsed "Tar and Liquor," to be delivered to the Town Clerk not later than Noon on the 10th of June next.

The Committee do not bind themselves to accept the highest or any tender.

JOSEPH HYDE, Town Clerk.

CAMBRIDGE UNIVERSITY AND TOWN GAS-LIGHT COMPANY.

TO TAR DISTILLERS AND OTHERS.

THE Directors of this Company will, at their Meeting on June 20, be prepared to receive TENDERS for the surplus TAR and the whole of the AMMONIACAL LIQUOR produced at these Works, for a period of One year, from July 1 next ensuing.

Further particulars may be had from the undersigned.

JAMES WEEKS, Manager.

Gas-Works, Cambridge,
May 23, 1889.

LONGWOOD GAS COMPANY, NEAR HUDDERSFIELD.

TENDERS for the surplus Tar and AMMONIACAL LIQUOR produced at the above Works for the ensuing Twelve months, commencing the 1st of July, 1889, are requested to be sent in to the undersigned.

Tenders, sealed and endorsed "Tender for Tar or Ammoniacal Liquor," to be sent in on or before Saturday, the 15th day of June, 1889.

The Liquor to be 5° Strength, tested by a Standard Twaddel's Hydrometer.

NEILL MEIKLEJOHN,
Manager and Secretary.

TAR AND AMMONIACAL LIQUOR.

THE Directors of the Accrington Gas and Water Works Company invite TENDERS for the TAR and AMMONIACAL LIQUOR to be produced at their Accrington and Great Harwood Works for One year, commencing on the 1st of July next. Coal carbonized at Accrington, 12,000 tons; and at Great Harwood, 8000 tons.

Any additional information can be obtained on application to the undersigned.

Tenders, endorsed, "Tender for Tar and Liquor," to be sent in not later than Wednesday, the 12th of June, addressed "The Chairman, Gas-Works, Accrington."

CHARLES HARRISON, Secretary.

Offices of the Company,
May 18, 1889.

CITY OF CARLISLE.

TENDERS FOR COAL AND CANNEL.

THE Carlisle Gas Committee are prepared to receive TENDERS for the supply of about 14,000 tons of screened or unscreened GAS COAL, and about 3000 tons of CANNEL, to be delivered at their Works in Carlisle in such quantities as may be directed, from July, 1889, to June, 1890.

Tenders, specifying the description of the Coal or Cannel, the pits at which they are raised, and the terms for net monthly payment, are to be sent on or before July 3, 1889, endorsed "Tender for Coal."

J. HEPWORTH,
Engineer and Manager.

Gas-Works, Carlisle,
May 22, 1889.

CITY OF CARLISLE.

TAR CONTRACT.

THE Carlisle Gas Committee are prepared to receive TENDERS for the surplus TAR to be produced at their Works, for a period of One or more years, from the 30th of June next.

Any further particulars required can be obtained upon application to the Engineer, to whom sealed tenders, endorsed "Tender for Tar," must be delivered on or before June 5, 1889.

The Committee do not bind themselves to accept the highest or any tender.

J. HEPWORTH, Engineer.

Gas-Works, Carlisle,
May 22, 1889.

CORPORATION OF HEREFORD.

TENDERS FOR YORKSHIRE GAS COAL.

THE Gas Management Committee of the Hereford Corporation are prepared to receive TENDERS for the supply of about 1000 tons per annum of best screened YORKSHIRE SILKSTONE GAS COAL, for a period of One, Two, or Three years, commencing from the 1st of August next.

Parties tendering are to quote a price per ton of 20 cwt. for the Coal delivered, carriage paid, in Colliery or Corporation wagons, on the Gas-Works Siding (Great Western Railway), Hereford.

Sealed Tenders, marked "Tender for Gas Coal," to be addressed to the Chairman of the Gas Management Committee, Mansion House, Hereford, on or before the 15th of June.

Further particulars and form of tender may be had on application to the undersigned.

The Committee do not bind themselves to accept the lowest or any tender.

WILLIAM PARLBY, Gas Engineer.

Gas-Works, Hereford,
May 31, 1889.

THE PETERBOROUGH GAS COMPANY.

TENDERS FOR COAL.

THE Directors of the above Company invite TENDERS for the supply of best screened GAS COAL and NUTS, for One or Two years, commencing the 1st of July next.

Form of tender and conditions may be obtained on application to the undersigned.

Tenders to be sent in by the 10th of June, 1889, endorsed "Coal," and addressed to the Chairman of the Company.

The Directors do not bind themselves to accept the lowest or any tender.

JOHN BARTON,
Secretary and Manager.

Gas-Works, New Road,
Peterborough, May 17, 1889.

THE PETERBOROUGH GAS COMPANY.

TENDERS FOR TAR.

THE Directors of the above Company invite TENDERS for the purchase of the surplus TAR produced at their Works, for One year, commencing the 1st of July next.

Form of tender and conditions may be obtained on application to the undersigned.

Tenders to be sent in by the 10th of June, 1889, endorsed "Tar," and addressed to the Chairman of the Company.

The Directors do not bind themselves to accept the highest or any tender.

JOHN BARTON,
Secretary and Manager.

Gas-Works, New Road,
Peterborough, May 17, 1889.

THE SHREWSBURY GASLIGHT COMPANY.

DISPOSAL OF SURPLUS TAR.

THE Directors of the above Company are desirous of receiving TENDERS for the purchase of the surplus TAR made at their Works during the Twelve months commencing July 1, 1889.

The estimated quantity for disposal is about 750 tons per Annum.

Forms of tender, containing all further particulars, may be obtained on application at the Company's Works, or by post.

Tenders to be sent in to the undersigned not later than the 15th day of June, 1889.

The Directors do not bind themselves to accept the highest or any tender.

By order,
WM. BELTON, Assoc. M. Inst. C.E.,
Secretary and Manager.

Gas-Works, Shrewsbury,
May 16, 1889.

THE SHREWSBURY GASLIGHT COMPANY.

TENDERS FOR COAL.

THE Directors of the Shrewsbury Gaslight Company invite TENDERS for the supply of best screened GAS COALS, to be delivered free at the Great Western or London and North-Western Goods Yard, Shrewsbury, during the Twelve months commencing July 1, 1889.

About 10,000 tons per Annum will be required under the contract.

The Directors reserve to themselves the right to divide the quantity into two or more contracts, and do not bind themselves to accept the lowest or any tender.

Forms of tender, containing all further particulars, may be obtained on application at the Company's Works, or by post.

Tenders to be sent to the undersigned on or before the 15th day of June, 1889.

By order,
WM. BELTON, Assoc. M. Inst. C.E.,
Secretary and Manager.

Gas-Works, Shrewsbury,
May 16, 1889.

RAMSGATE CORPORATION.

GAS AND WATER DEPARTMENT.

THE Gas and Water Committee invite TENDERS for the supply of first-class NEWCASTLE GAS COAL in three Annual quantities of 12,000 tons each, delivered free into carts on the Quay of Ramsgate Harbour. The first 12,000 tons to be delivered in equal monthly quantities, between the 1st of September, 1889, and the 31st of August, 1890; and the second and third years' supply in equal monthly quantities, between the 1st of September, 1890, and the 31st of August, 1891, and the 1st of September, 1891, and the 31st of August, 1892. Separate prices to be named for each annual quantity.

Tenders to be sent in not later than Tuesday, June 11, addressed to the Chairman of the Gas and Water Committee, Hardres Street, Ramsgate, and endorsed "Coals."

The Committee do not bind themselves to accept the lowest or any tender.

Full particulars and form of tender on application to

WILLIAM A. VALON, Engineer.

WESTGATE AND BIRCHINGTON GAS COMPANY.

THE Directors of the above Company invite TENDERS for the supply of first-class NEWCASTLE GAS COAL in three Annual quantities of 1500 tons each, to be delivered free in Trucks, at the Westgate Railway Station, L. C. & D. Line. The first 1500 tons to be delivered in equal monthly quantities, between the 1st of September, 1889, and the 31st of August, 1890; and the second and third years' supply in equal monthly quantities, between the 1st of September, 1890, and the 31st of August, 1891, and the 1st of September, 1891, and the 31st of August, 1892. Separate prices to be named for each annual quantity.

Tenders to be sent in not later than Tuesday, June 18, addressed to the Chairman of the Westgate and Birchington Gas Company 3, Princes Street, Storey's Gate, Westminster, S.W., and endorsed "Coals."

The Directors do not bind themselves to accept the lowest or any tender.

Full particulars and form of tender on application to

WILLIAM A. VALON, Engineer.

COUNTY BOROUGH OF SALFORD.

(GAS DEPARTMENT.)

TENDERS FOR IRONWORK.

THE Gas Committee invite Tenders for the COLUMNS, GIRDERS, FLOOR-PLATES, BUCKSTAVES, RETORT MOUTH-PIECES, HYDRAULIC MAINS, and other IRONWORK required for the Liverpool Street Gas-Works.

The drawings and specifications may be seen on application to the Engineer, Gas Offices, Bloom Street, Salford.

Sealed tenders, addressed to the Chairman of the Gas Committee, and endorsed "Tender for Ironwork," to be delivered at my Office not later than Five p.m., on Thursday, the 13th of June, 1889.

By order,
SAM. BROWN, Town Clerk.

Town Hall, Salford,
May 25, 1889.

CORPORATION OF LANCASTER.

(GAS DEPARTMENT.)

TENDERS FOR GAS COAL.

THE Gas Committee are prepared to receive TENDERS for the supply of about 7000 tons of GAS COAL per Annum, delivered on the Gas-Works Siding, Lancaster, in such quantities and at such times as may be required during a period of One, Two, or Three years, commencing delivery in July next.

Sealed Tenders, endorsed "Gas Coal," giving full particulars of the Coal offered, must be sent to Thorn Swainson, Esq., Town Clerk, Lancaster, on or before the 17th day of June next.

Forms of tender may be obtained on application to the undersigned.

The lowest or any tender not necessarily accepted.

C. ARMITAGE

Gas-Works, Lancaster,
May 21, 1889.

THE GASLIGHT AND COKE COMPANY.

NOTICE is hereby given that the TRANSFER BOOKS of this Company, so far as they relate to the Debenture Stocks and Bonds, will be CLOSED at One o'clock p.m. on Saturday, the 8th of June next, for the Half Year ending on the 30th of June, 1889, and that the Interest for that Half Year will be payable on the 1st of July next to the Proprietors registered as the Holders of such Debenture Stock and Bonds at the time of such closing of the Transfer Books, which will be re-opened for the following Half Year on the morning of Tuesday, the 11th of June next.

By order.
JOHN ORWELL PHILLIPS,
Secretary and General Manager.

Chief Office, Horseferry Road,
Westminster, S.W., May 30, 1889.

Price 2s. per dozen, or 10s 6d. per 100, post free.

CONSPIRACY and Protection of Property Act. It is required, under a Penalty of FIVE POUNDS, that a Printed Copy of the 4th Section of this Act shall be posted up at all Gas-Works, in a conspicuous place, where the same may be conveniently read by the persons employed thereat.

Printed copies of this Section, in large type, on broad sheets, may be obtained of WALTER KING, 11, Bolt Court, FLEET STREET, E.C.

*** *The Act extends to Scotland and Ireland.*

TO INVENTORS AND PATENTEES.

MR. W. H. BENNETT having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their Inventions may be secured for Twelve months; or LETTERS PATENT, which are granted for Fourteen Years.

Patents completed, or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.

Patents procured for Foreign Countries.

Information as to cost, &c., supplied gratuitously upon application to the Advertiser, 22, Great George Street, WESTMINSTER.

Plans and Description of the Extensions

AT THE

WINDSOR STREET GAS-WORKS OF THE BIRMINGHAM CORPORATION,

DESIGNED AND CARRIED OUT BY

CHARLES HUNT, M. Inst. C. E.,

Engineer of the Works.

London: WALTER KING, 11, Bolt Court, FLEET ST., E.C.

JUST PUBLISHED.

EDITED BY CHARLES W. HASTINGS.

The Gas & Water Companies' Directory, 1889.

Demy 8vo, 270 pp., Cloth Boards, 5s., Post Free.

GAS-WORKS STATISTICS, 1889.

Demy 8vo, Stiff Covers, 104 pp., 3/6, Post Free.

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The above Three Works, Handsomely Bound in Cloth, in One Volume,

PRICE 10s. POST FREE.

These Books have been thoroughly revised to date, and contain much valuable and additional information. PROSPECTUS, giving SPECIMEN PAGES AND PRESS OPINIONS, post free on application to the Publishers,

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TAR AND LIQUOR PURCHASED

JOHN CLARKSON MAJOR,

(Established 1851,)

Tar Distiller and Manufacturing Chemist,

WOLVERHAMPTON.

BRANCH WORKS:—

SCULCOATS, HULL.

For **FIRE-BRICKS,** the most durable for **GAS-FURNACES,**

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COMBINES THE

Advantages of the Inferential and Positive Meters hitherto in use.

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Having had much experience in the Setting of Retorts, beg to call the attention of Gas Engineers and Managers to their Improved System of Setting Retorts and Tar-Furnaces.

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THE ONLY RELIABLE

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WORKING ONE, TWO, THREE, OR FOUR PURIFIERS ON AT THE TIME.

ALSO MADE FOR TWO OR THREE PURIFIERS.

No Springing. No Leakage. No Foul Gas passed in Changing. Special Facility for Blowing the Air out of the Fresh Box before putting in Action, without driving it forward into the Holders.

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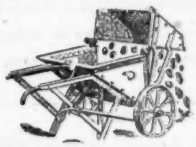

effecting a great saving of time, labour, and expense.

For particulars, price &c., apply to Mr. E. PRICE, Inventor and Patentee, Gas-Works, Hampton Wick, MIDDLESEX.

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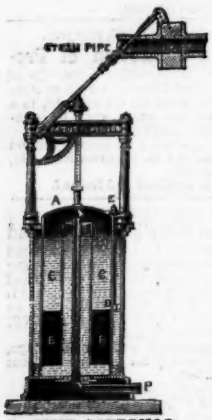
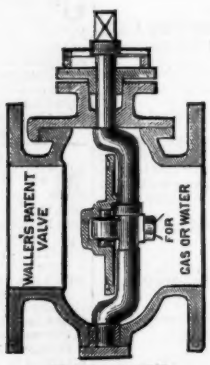
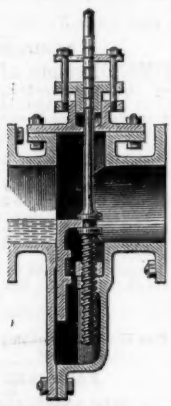


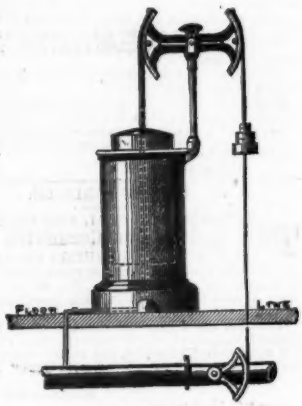
PATENT GOVERNOR.



CRANK VALVE.



HYDRAULIC MAIN VALVE.



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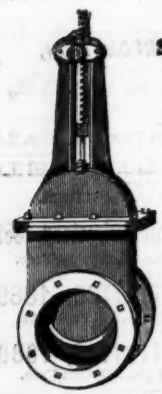
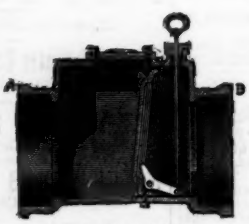


OUTSIDE RACK VALVE.



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CANDLE SAFETY LAMPS.
Are a great improvement on Oil, giving a good Light, requiring little or no Cleaning, and when once lighted no further attention is necessary. The Candles are made to burn 5, 7, or 9 hours.

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WENLOCK IRON WHARF, 21 & 22, WHARF ROAD,
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Manufacture and keep in Stock at their Works (also large stock in London)
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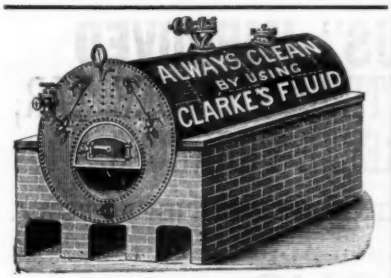

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And much smaller Coal Bills. Softens the Hardest Water, and keeps Gauge-Glasses quite clear.

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CHANDLER'S PATENT.
SUITABLE FOR EVERY FORM OF LIGHTING.
A beautiful white light from ordinary Gas. Silent, steady, and economical.
PACKED IN BOX 9s., SUBJECT.
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FIRE-BRICK AND TILE MERCHANTS,
Wholesale and for Exportation,
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DEPÔT for STOURBRIDGE AND NEWCASTLE FIRE-BRICKS, LUMPS, TILES and FIRE-CLAY, and every Article suitable for
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GANISTER BRICKS
OF VARIOUS SIZES,
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SUPPLIED FROM
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PEASE & PARTNERS, Limited,
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GAS AND WATER PIPES.
1½ to 12 IN. BORE.

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Now offer their superior
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LANEMARK CANNEL.
Yield of Gas per ton . . 10,880 cub. ft.
Illuminating Power . . 29·21 candles.
Coke per ton . . . . 1266·96 lbs.

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Yield of Gas per ton . . 11,379 cub. ft.
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Yield of Gas per ton . . 10,734 cub. ft.
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SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.

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POPE & PEARSON, LTD.,
have now the authority of several of the most eminent Gas Engineers of London in stating that their Coal yields in practical working over 10,000 cubic feet of gas, with an illuminating power of 16 candles; or by the standard burners now used by the London Gas Companies, an illuminating power equal to 17½ candles.
One ton yields 12¼ cwt. of good coke.
This Coal can be shipped from Hull, Goole, Liverpool, Morecambe, and Barrow.
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MANUFACTURERS OF
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STEEL OF ALL DESCRIPTIONS.
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Awarded HIGHEST MEDAL and DIPLOMA at the Newcastle-on-Tyne Royal Mining and Industrial Exhibition, 1887, for
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TYNE BOGHEAD CANNEL.
Yield of Gas per ton . . . . . 13,155 cub. ft.
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Coke per ton . . . . . 1,301·88 lbs.

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Yield of Gas per ton . . . . . 10,500 cub. ft.
Illuminating Power . . . . . 16·3 candles.
Coke . . . . . 70 per cent.
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This Coal yields 12,600 feet of 19-candle gas per ton.

Weight of illuminating matter in pounds of sperm, 820·80. Very free from impurities.

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MANUFACTURERS OF WROUGHT-IRON TUBES AND FITTINGS, BRASS GAS-FITTINGS, GAS-VALVES, STEAM AND WATER VALVES, &c.,

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Glass-House Furnace Bricks.

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CASTINGS & EVERY REQUISITE FOR GAS WORKS

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SPECIAL BRICKS FOR SECONDARY AIR SUPPLY & REGENERATOR FURNACES

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Best Glass-House Pot & Crucible Clay.

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Lamps giving 20-Candle power consume less than four feet of Gas per hour.

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SPECIAL NOTICE.—Our Patent Machine-Made Retorts have now been thoroughly tested, and have proved themselves infinitely superior to those made by hand. At several large works it has been settled, beyond question, that, owing to the compactness and general excellence, more gas is sent to the gasholder from each ton of coal carbonized than is the case with hand-made Retorts.

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THREE MEDALS AND HONOURABLE MENTION

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For their Various Exhibits, amongst which is a

SILVER MEDAL FOR THEIR PATENT MACHINE-MADE RETORTS AND FIRE-BRICKS,

Being the Highest Honour given for this Class.

London Wharf: No. 4, inside Great Northern Goods Station, King's Cross, N. Liverpool: Leeds Street.

BELL'S ASBESTOLINE.

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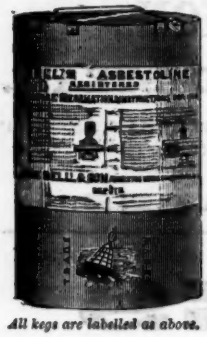

All kegs are labelled as above.

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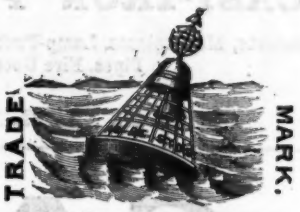
ASBESTOLINE is the most efficient Lubricant for all bearings.
ASBESTOLINE is the cheapest Lubricant.
ASBESTOLINE saves from 50 to 90 per cent. of the Cost of Oil.
ASBESTOLINE is the cheapest Lubricant.
ASBESTOLINE is favoured by Insurance Companies.
ASBESTOLINE is the most Inodorous Lubricant.
ASBESTOLINE is the safest Lubricant from Ignition.
ASBESTOLINE has beaten all other Lubricants in trials.
ASBESTOLINE is applicable in and out doors in every Climate.
ASBESTOLINE requires no special application.



CONSISTENCY OF ASBESTOLINE.

ASBESTOLINE, to meet all circumstances, is made in four degrees of consistency—A, B, C, and CC.

ASBESTOLINE, A, is specially adapted to ordinary Land Engines and Machinery, in and out door, in this country.

ASBESTOLINE, B, a little more solid, is for use on Steamships in temperate climates, also on land when it is desirable to have Lubricant stiffer than A.

ASBESTOLINE, C, is for use in tropical climates, both ashore and afloat. It is also invaluable in works in this country when the temperature is high.

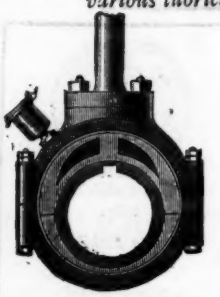
ASBESTOLINE, CC, is designed for use on Calenders, Paper-Machines, &c., where the bearings are heated by steam passing through, and sometimes is advantageously used instead of C.

The reputation of Asbestoline as a Lubricant of the highest efficiency in every kind of Machinery is established; and it has never been equalled by any other Lubricant in the numerous cases of special difficulty in which the best oils are ineffectual. It is used with marked success in Steel and Iron Works, Collieries, Cotton and Wool Mills, and other Textile Manufactories. In Corn-Mills it has proved invaluable on the roller and other modern machines. In Saw-Mills, on machines going up to 5000 revolutions per minute, its work has never been approached by any other Lubricant. On Electric Lighting Machinery, and in Steamships of all sizes throughout the world, the success of Asbestoline is unequalled. Many engines and machines of all descriptions give trouble, and show bad results both in working and wear, when the system of lubrication has not received due consideration. Engineering firms of the highest standing have given to it their powerful testimony and support.

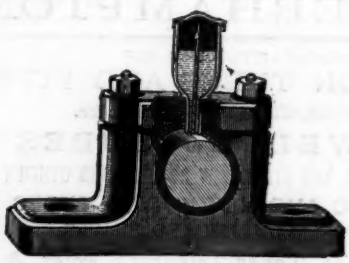
Supplied in Kegs, 28, 56, or 112 lb. Price, 2/3 per lb. Kegs Free. Special Terms for Large Quantities.

IMPORTANT TO EXPORT MERCHANTS.—*One pound of "Asbestoline" equals 2 gallons of Oil weighing 18lbs.; consequently the saving in freight is very considerable. Liberal Terms are conceded to Export Merchants.*

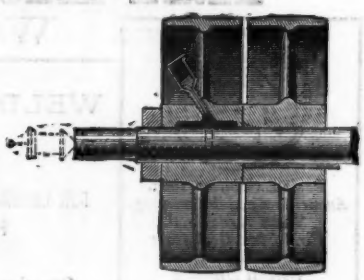
Below will be found illustrations of the mode of fixing Lubricators for Asbestoline to bearings. Full particulars of the various lubricators supplied for Asbestoline, and the manner of fitting, in catalogue free on application.



Lubricator fitted to Eccentric of Vertical Engine.



Showing Section of Lubricator fitted to ordinary Bearings.



Lubricator in different position for Loose Pulleys.

THE ATTENTION OF

ENGINEERS, AND ALL USERS OF STEAM POWER AND MACHINERY,

IS SPECIALLY INVITED TO THE FOLLOWING REPORT.

Owing to the number of Greases now offered, samples of BELL'S ASBESTOLINE were submitted to Otto Hehner, Esq., for analysis, and the subjoined Report fully proves BELL'S ASBESTOLINE to be the safest as well as the best Lubricant for all purposes:—

The Laboratory, 11, *Billiter Square, E.C., London, May* 3, 1888.

I have subjected a sample of Bell's Asbestoline taken from the stores of Messrs. J. Bell and Son, in Southwark Street, to a number of tests, in order to ascertain whether its use in Mills or Factories might contribute to the danger from Fire.

I found that Asbestoline **ignites only with the greatest difficulty** when brought into contact with flame; that wood and other combustible material soaked in Asbestoline burns, if anything, with greater difficulty than by itself; that its **flashing point is so high that it lies beyond the range of Mercurial Thermometers**; and that consequently no friction obtainable in the ordinary run of machinery is capable of developing inflammable vapours from it.

Bell's Asbestoline is **as absolutely safe a Lubricant as can be desired or obtainable.** In the case of fire breaking out from any cause, it does not assist the conflagration; and it is **quite incapable of leading to spontaneous combustion**, either by itself or in contact with inflammable material.

From the physical nature of Asbestoline its use is of necessity perfectly clean and free from waste.

(Signed) OTTO HEHNER, Public Analyst.

Illustrated Priced Catalogue, with numerous Testimonials by Leading Firms, free on application.

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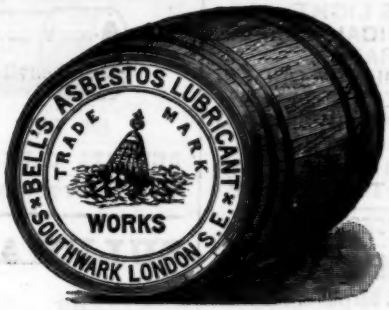
BELL'S ASBESTOS LUBRICANT.

(REGISTERED.)

All Drums marked as above.



Every Cask is sent out as above.

All Corks are sealed as above.

Any Customer receiving Oil sold as Bell's Asbestos Lubricant, and Cask, Drum or Corks not marked as above, is earnestly requested to forward us sample and particulars of where obtained.

The following Oils, refined and prepared by our Asbestos process, are specially recommended to Users of Machinery of every kind in all parts of the world. We guarantee the quality of each to be unequalled at the price for the purpose named, and a Sample Drum, containing 5 gallons of each or any sort, will be sent on approval to any respectable firm in any part of the world :—

BELL'S SPECIAL GAS-ENGINE OIL.—This oil is guaranteed to stand flame temperature, and is suitable for light Machinery and Shafting where gas power is used.
Price 2s. 9d. per gallon.

1a.—BELL'S SPECIALLY PURIFIED DARK CYLINDER AND VALVE OIL.—This oil is guaranteed not to gum, corrode, or in any way injure metal surfaces. It will not carbonize, nor leave any deposit whatever in cylinders or condensers, nor will it injure india-rubber valves. It is absolutely pure hydrocarbon, and will work admirably in all good Sight-feed Lubricators.
Price 3s. 9d. per gallon.

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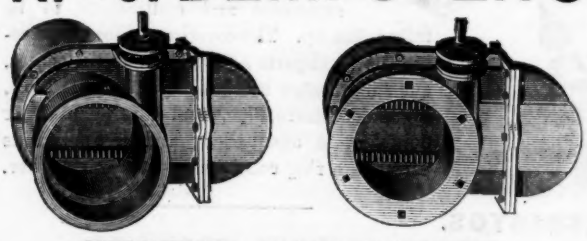

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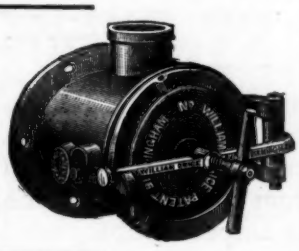

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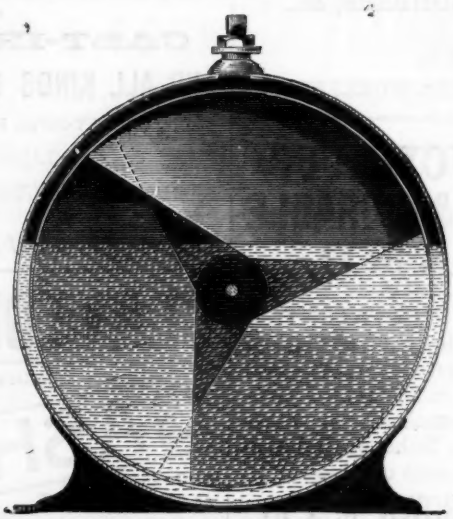

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